# Chemical Age

VOL LXIV

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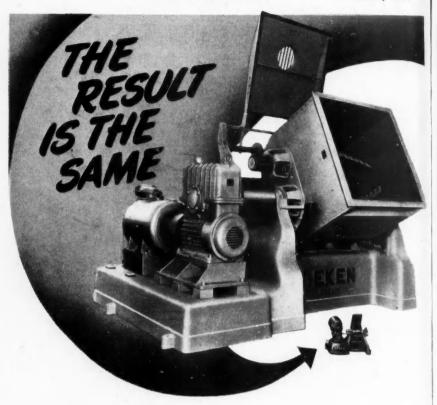


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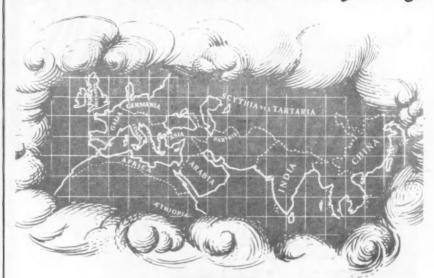
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## INDEX TO ADVERTISERS IN THIS ISSUE

Accrington Brick & Tile Co., Ltd. (The) Cover	Page iv Jenolite, Ltd.
Adequate Weighers, Ltd.	vi Jobling, James A., & Co., Ltd. xliv
	viii Johnson, Wm., & Sons (Leeds), Ltd.
Alumina Co., Ltd.	xvi Jones, Tate & Co., Ltd. xx
Amalgamated Oxides (1939), Ltd.	xix Joynes, H. & Co., Ltd. xxxviii
	xvi
Anson Geo & Co led	wiii   Kernick & Son. Ltd. xxxii
Associated Lead Manufacturers, Ltd.	lix Kestner Evaporator & Engineering Co.
Audley Engineering Co., Ltd.	Ltd. Corel IV & AAATIII
	Kilner, John, & Sons (1927), Ltd. Iviii
Radger F R & Sone (Ge Britain) Led	I I I I I I I I I I I I I I I I I I I
Badger, E. B., & Sons (Gt. Britain) Ltd. Baker Perkins, Ltd.	Lankio Chemicais, Ltd.
Baldwin Instrument Co., Ltd. xx	x Lavino (London), Ltd. Cover ii Leeds & Bradford Boiler Co., Ltd. Ixxi
Barbet, Ltd.	kvii Leeds & Bradford Boiler Co., Ltd. Ixxi Leigh & Sons Metal Works Ixx
	klii Leitch, John W., & Co., Ltd. xliv
Berk, F. W., & Co., Ltd.	dii Leitch, John W., & Co., Ltd. xliv Lennox Foundry Co., Ltd. lxxii
	viii Light, L. & Co., Ltd. Ixiv
Blackwell's Metallurgical Works, Ltd.   1x	xii Lord, John L. xii
Blundell & Crompton, Ltd. Cover Boots Pure Drug Co., Ltd. Bowmans Chemicals, Ltd.	iii
Boots Pure Drug Co., Ltd.	iii Manesty Machines, Ltd. xvi & xl
Bowmans Chemicals, Ltd. x	viii Marchon Products, Ltd. xiii
British Acheson Electrodes, Ltd.	dvi Metafiltration Co., Ltd. (The) xvi
British Carbo-Norit Union, Ltd. Ix	xii Metcalf & Co. xlii
British Celanese, Ltd.	iv Midland Tar Distillers, Ltd.
British Drug Houses, Ltd. (The)	viii Monsanto Chemicals, Ltd. 115
British Drug Houses, Ltd. (The) Ix Broadbent, Thomas, & Sons, Ltd. Brotherhood, Peter, Ltd.	xxi Moritz Chemical Engineering Co., Ltd. xxviii
Brotherhood, Peter, Ltd.	I I I I I I I I I I I I I I I I I I I
	Murphy, G. L., Ltd. xlii
Candy Filter Co., Ltd. (The)	V National Enamels, Ltd. xliii
Cannon Iron Foundries, Ltd.	V National Enamels, Ltd. XIIII XXX Negretti & Zambra, Ltd. XXXVIII VIII New Metals & Chemicals, Ltd. XIII
Carty & Son, Ltd.	Negretti & Zambra, Ltd. XXXVIII VIII New Metals & Chemicals, Ltd. XII
Castle Engineering Co. (Nottingham) Ltd. (The)	Nitralloy, Ltd.
Chemitrade, Ltd.	lii Nordac, Ltd. xxxiv
Classified Advantisements 120 lair law 8. h	KXI
Cohen, George, Sons & Co., Ltd. xx	kiii Oertling, L., Ltd. 119
Crofts (Engineers), Ltd.	vii Olive, Burton & Co., Ltd. xxxviii
Cruickshank, R., Ltd.	tvii Orr. George W., & Co., Ltd. Ixxi
Cyanamid Products, Ltd.	113
	lxi Pascall Engineering Co., Ltd. (The) Cover iii
	Paterson Engineering Co., Ltd. xv
Drayton Regulator & Instrument Co., Ltd.	Penrhyn Quarries Ixxii
	rerry & riope, Ltd. AXXVIII
	in Tower-das Corporation, Etc. (The)
Dryden, I., Ltd. Dunford & Elliott (Sheffield), Ltd. xx: Dustek Bros. & Co. Ltd.	
Dussek Bros. & Co., Ltd. x	
A 400 A 400 A 400 A	Quickite & Quartz, Ltd.
	Robinson, L., & Co. (Gillingham), Ltd. xxvii
Electroflo Meters Co., Ltd.	Rysland (Manchester) Ltd
Evans, Adlard & Co., Ltd.	
Evershed & Vignoles, Ltd.	ly Sandiacre Screw Co., Ltd. (The) xx
	Simm, G. E. (Machinery), Ltd.
Feltham, Walter H., & Son, Ltd.	19 Smith, Sydney (Industries), Ltd. xviii
Film Cooling Towers (1925), Ltd.	xiv Solway Flowrators, Ltd. Ixv
Flaig, W. G., & Sons, Ltd.	lvi Spencer Chapman & Messel, Ltd. vii
Foamite, Ltd.	xii Stanton Instruments, Ltd. xxiii
	viii Steel, J. M., & Co., Ltd. 119
Foxboro-Yoxall, Ltd.	lvii Stewart & Gray, Ltd. Ixvi
Foyle, W. & G., Ltd.	Thompson, John (Dudley), Ltd.
	Thompson, John (Dudley), Ltd.
General Chemical & Pharmaceutical Co.,	Thorn, J., & Sons, Ltd. xl
Ltd., (The)	Thorn, J., & Sons, Ltd. xl Tinsley, H., & Co., Ltd. xxxiv Tipple, W., & C., Ltd. lxvi
George, W. & J., & Becker, Ltd.	
Grazebrook, M. & W., Ltd. xx	
Grazebrook, M. & W., Ltd. xx Greef, R. W., & Co., Ltd.	xiv Trapinex, Ltd.
Greening, N., & Sons, Ltd.	Tyrer, Thos., & Co., Ltd. xxxvii
Guest Industrials, Ltd. xxx & I	Welsh Silica Co., Ltd. xxxviii
Harris (Lostock Gralam), Ltd. Cover	iii Wilkinson, James, & Son, Ltd. xxv
Haughton's Metallic Co., Ltd. xxx	Wilkinson Rubber Linatex, Ltd. 1x
Haworth, F. (A.R.C.), Ltd.	Wolf, Victor, Ltd. xxxii
Holden, Chris., Ltd.	xlii Wood & Fairweather lxxii
Harris (Lostock Gralam), Ltd.  Haughton's Metallic Co., Ltd.  Haworth, F. (A.R.C.), Ltd.  Holden, Chris., Ltd.  Holland, B. A. Engineering Co., Ltd., (The)	xvi Wood, Gilbert (A/M), Ltd. lxiii
Howards & Sons, Ltd. Front Cov	rei
Invested Character Line 1971 Land	Yorkshire Tar Distillers, Ltd. xli
Imperial Chemical Industries, Ltd.	xv Young, B., & Co., Ltd.

xxii viii lviii

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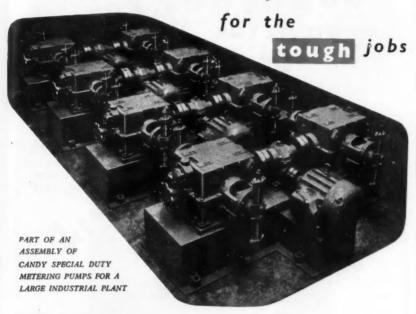
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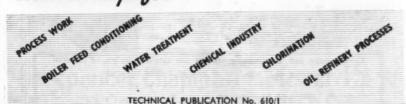
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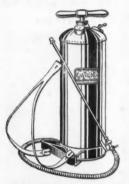
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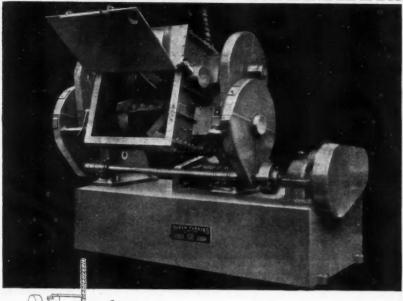
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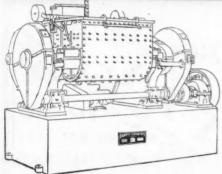
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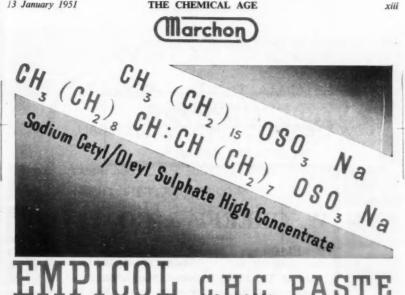
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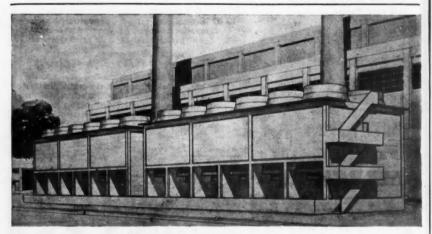
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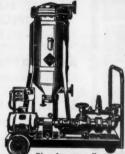
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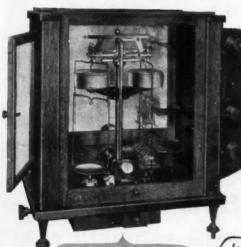
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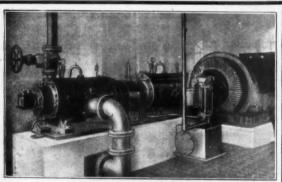
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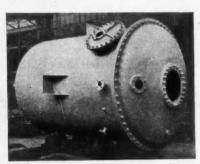
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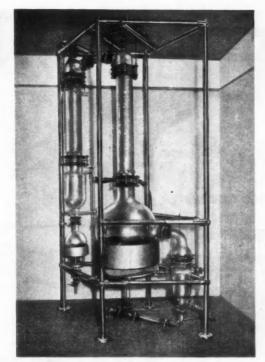
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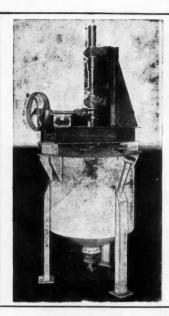
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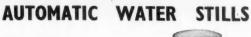
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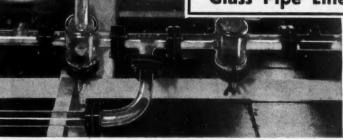
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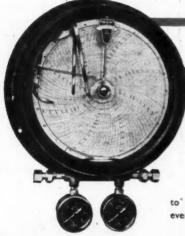
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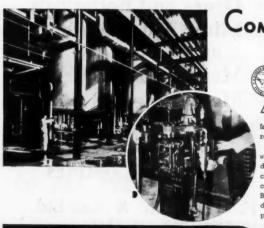
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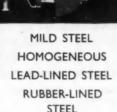
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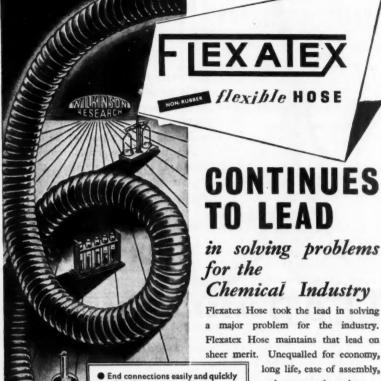
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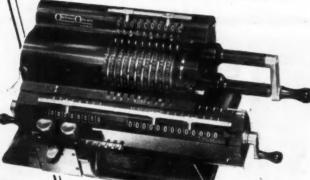
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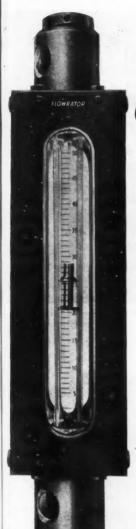
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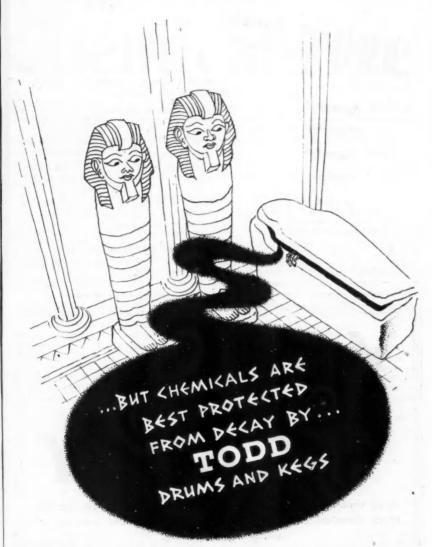
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Volume LXIV

13 January 1951

Number 1644

## More Progress Reported

IN the last issue for 1948 these comments were devoted to the 1948 Annual Reports on the Progress of Applied Chemistry issued by Society of Chemical Industry. new Reports for 1949 are again substantially enlarged and this welcome expansion no doubt explains why the interval between publications has slightly exceeded the nominal twelve months. However, no student of these valuable accounts of progress will criticise the Society for failing to reduce the delay between publication and the period of reportage. The size of the new volume tells its own story. There are nearly two hundred more pages than in the 1948 Reports. and over four hundred more than in the 1947 edition. Let it be hoped that cellulosic austerity belongs to non-repeatable history; for, even though the national paper situation is again disturbing, this yearly British com-mentary upon advances in applied chemistry is not a mere perquisite of members of the Society of chemical Industry. It is a major contribution to world science and now, with 928 slightly enlarged pages, it has reached a fitting size and shape for the first time in the nineteen-forties. And this, most readers will surely feel, is the size the "hardy annual" should stay, neither smaller

nor larger. Any further expansion will tend to bring the problem of sub-division, of bi-volume issue; and the loss of compactness will detract from the value of additional reportage.

The number of specialist contributors has increased from 50 to 61. These chemists, and Mr. Clark, the Society's Editor, deserve the fullest thanks of all engaged in chemical or partially chemical industry. Indeed, the range of these Reports now passes far beyond the old-time confines of the chemical industry and as many of the 31 sectional Reports concern industries in which the chemist intervenes as well as those which actually produce heavy or fine chemicals.

There are several changes from the preceding year. Previously, gas, destructive distillation, tar and tar products were treated together; now tar and tar products have a separate section. The former section on fuel is retained but it is now placed—as it should be—next to the gas and tar sections. A major alteration has been made to deal with fine chemicals and medicinal substances. Formerly there was a single section on medicinal substances—now, with the formation of a Fine Chemicals Group in the Society, this section is collectively prepared by members of the group and for 1949 it is comprised of eleven

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sub-sections. It might be commented that the addition of the term "fine chemicals" to this re-shaped section is somewhat misleading for it remains predominantly devoted to fine chemicals used in medicine or nutrition. A separate section is still preserved for antibiotics but the new group treatment for medicinal substances has eliminated previous over-lapping of the two sections.

It is probably a belated sign of the times that there should be an entirely new section for cosmetics and toilet preparations; even those chemists who are concerned neither with making these products nor with their own appearance will find that this quite short contribution makes interesting An objective review of reading. chemicals which are used for highly subjective reasons has intriguing qualities for the non-expert reader. Sanitation and water purification are no longer treated jointly. Water now has its own section, followed by another section on sewage, rivers pollution and trade wastes. This is another valuable alteration, no doubt made possible only by the Society's increased supply of paper. Though there are several connections between sewage disposal problems and water supplies, the inter-relationship is not so large and continuous that joint reportage should be logical or desirable. Indeed, the space given in previous volumes to these subjects has been disproportionately small having regard to the industry's huge use of water and its almost equally huge aqueous disposal problems. There is still possibly a case for separating the discussion of sewage from that of rivers pollution.

A titular change that is less obviously an improvement is the conversion of the former section upon insecticides into one on the "control of pest infestation". This section is, as before, separate from the Group-contributed section on agriculture and horticulture, and beyond doubt the reason is that insecticides are also used extensively for non-agricultural purposes. There is no easy solution to this problem of diversity. A full

treatment of crop pest control in the agricultural section would lead to considerable overlapping; it might, however, be suggested that the generalised treatment of insecticides would be advantageously sub-divided with some distinction between discussions on using these important chemicals in crop protection and for other pest control purposes.

Despite the enlargement of the publication, two sections have disappeared, that on foods and the smaller section on starch. It is stated that a Report on foods will appear in the 1950 issue and will cover 1949-50. The temporary omission of this subject is somewhat remarkable, however, in what seem once again to be the hungry, or at any rate, highly food-conscious 'forties. If in the 1950 volume food chemistry is to be given a space appropriate to its importance, it is clear that the size of the publication must either increase once more or the space for other subjects be significantly curtailed.

The sections have an excellent "readability"-the contributors are increasingly realising that broad and illuminating comment upon trends and tendencies is just as important as the terse cataloguing of research contributions. The improvement of the Reports in this respect was noticeable for 1948 and it is still more noticeable for 1949. Possibly this advance in presentation flows from the steady widening of the "contributors' list"? Whatever the causative factor may be, the fact itself is most welcome, especially to readers who try to maintain an interest in fields other than own. Criticisms would churlish indeed, but one constructive suggestion might be offered. Now that the Group-prepared Report is invading these annual steadily volumes, sub-sectional contents lists could usefully accompany the introductory matter. Little space would be required for this, and it would increase the convenience of the volume in its major function as a reference book.

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## **Notes and Comments**

A Goodly Heritage

WITH the turn of a century or half-century, man, while wondering what the future holds in store, naturally tends to look back on the progress made through the years and those prominent figures who have contributed to the world's advancement. The British chemical industry is particularly rich in such personalities and at the start of 1951 a number of well-known names come to the mind. Two hundred and twenty years ago in 1731 there was born in Nice, of English parents, Henry Cavendish, who in later life was to be the first person to discover that water was composed of oxygen and hydrogen. Thirty years later, in 1761, saw the death of Stephen Hales, a vicar of Teddington, Middlesex, who found that plants absorb part of their food from the air and, later, in his principal book stressed the importance of accuracy in chemical measurements. Coming down to 160 years ago, 1791 saw the birth of two great

scientists. John Mercer, father of textile chemistry and Michael Faraday, who discovered how to liquefy chlorine and isolate hexachloroethane. The 19th century was also rich in its share of scientific achievement. In 1801, Thomas Clark was born in Avr. A Scottish doctor, he found that hard water could be softened by chemical means, Little is known about Peregrine Phillips, whose contact process for making sulphuric acid was patented in 1831, though not commercially developed until 70 years later. 1861 saw the birth in Eastbourne of Sir Frederick Gowland Hopkins, whose early researches led to the discovery of vitamins, while 10 years later, in 1871, there was born in New Zealand, Ernest Rutherford (afterwards Lord Rutherford), one of the great pioneers of atomic physics. It is not, of course, possible to pass judgment on one's contemporaries, but nevertheless there must assuredly be many who will be considered worthy to rank with this goodly heritage.

## On Other Pages '

On Other rages			Chemical Imports in November .		88
Leader:			Growth of Thermoplastic Extrusion	ı	89
More Progress Reported .		41	Insecticides in 1950 .		91
	•	-91	Erucic Acid Separation .		93
Notes and Comments:		40	Sutherland Dolomite .		94
A Goodly Heritage .		43	Versatile Coal .		95
National Inventions .		44	The Magadi Lake in Kenya .		99
Labour and the Chemical Industry	*	45	International Agreements Studied		100
Alternative Zinc Sources .		46	American Chemical Notebook .		101
New Chemicals from Seaweed .	*	47			102
Insecticides and their Study .		48			103
ANNUAL REVIEW			Personal .		106
Review of 1950		49	Bookshelf .		107
Y 2 . ' 1 Y 1 ' NOWS		71	Next Week's Events .		109
73 . 191			Stock and Chemical Markets .		110
Non-Ferrous Metal Statistics .		76	Law and Company News .		112
Progress in Drugs and Medicinal			Technical Publications .		114
Chemicals .		77	New Patents .		116

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## National Inventions

## First Year's Progress in Research Development

THE first annual report of the National Research Development Corporation has just been published. In this report the corporation, which was formed in June 1949 to ensure that nationally valuable inventions should be developed or exploited, indicates that the first year has been spent mainly in establishing friendly liaison with organisations likely to produce inventions. Even so, 965 inventions were submitted. One of these, now being exploited, has brought in a revenue for the corporation of £3566 during the year.

The corporation expects to become the owner of practically all inventions made in the laboratories of Government departments and some other bodies with certain exceptions. No inventions useful for defence will be touched, nor will the corporation handle inventions in gas turbines or in the field of atomic energy.

Agreement has been reached with the governing bodies of universities and university colleges on the terms of a letter in which the corporation invites univer-

sity workers to submit their inventions. The aim is to assist in the development of inventions without interference with the prompt publication of laboratory results and without damaging the financial interests, either of universities or patentees.

The corporation claims the goodwill of the forty industrial-research associations, partly financed by grant from the Department of Scientific and Industrial Research. However, no inventions from this source had been received by the end of June. Private individuals and firms have made submissions and the Nuffield Foundation's trustees hope that rights in inventions made by recipients of Nuffield grants will be assigned to the corporation, which is willing to be responsible for their development and exploitation. The corporation has also been approached by scientific agencies of Commonwealth Governments eager to exploit in Britain inventions made in their own countries.

The following table shows what happened to inventions submitted to the corporation during the first year.

	Being Considered or Awaiting Being							
Source	Submitted	Rejected	Transfer	Accepted	Exploited			
Government Departments Agricultural Research	444	_	401	3	40			
Council	2	_	2	_	-			
Medical Research Council	12	3	2	_	7			
Universities	20	2	2		16			
Industrial Research								
Organisations	_	Million or	-	-	_			
Charitable Organisations	2	_	1	-	1			
Public	485	358	122*	3	2			
Total	965	363	530	6	66			
* Includes 105 cases in resp	ect of which	m re info	rmation is l	heing sough	t.			

## Licences for Sulphur

LICENCES operating from 8 January have now been issued by the Board of Trade to consumers of crude, recovered, and processed sulphur and to producers of sulphuric acid.

Amounts of sulphur which may be consumed for acid-making or delivered to consumers for other industrial purposes are specified. With sulphuric acid—whether produced from crude sulphur or from other sulphur-bearing materials such as pyrites and spent oxide—the acid producer is licensed to supply a certain quantity to specified customers based on his deliveries to them during April-September, 1950.

In general, consumers of crude, recovered, or processed sulphur or of acid produced from crude sulphur are restricted to two-thirds of their takings in the basic period. Consumers of acid derived from materials other than sulphur are not so far materially affected.

The requirements of all consuming industries are being further studied as a matter of urgency, the Board states, and Government departments concerned will be considering what adjustments in rationing arrangements are necessary in the interests of the national economy.

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## LABOUR AND THE CHEMICAL INDUSTRY

MPLOYMENT of persons associated with the chemical and allied trades in Great Britain at the end of October, 1950, showed a total of 460,000, an increase of 2,000 over the figures for the previous month, and 27,000 more than at the end of 1948, according to the analysis of civil employment in the Ministry of Labour Gazette (Vol. 58, No. 12).

Changes in the level of employment on the industrial analysis relate to employees only and exclude employers and persons working on their own account. The total numbers in Great Britain employed in chemicals and allied trades (in thousands) were 455.1 in October, as against 453.0 in September and 420.9 in mid-1948.

Detailed distribution (in thousands) was as follows:—Coke ovens and by-product works 17.2 (16.7 men, 0.5 women), chemicals and dyes 207.0 (153.4 men, 53.6 women); pharmaceutical preparations, etc., 35.1 (14.0 men, 21.1 women); explosives, etc., 37.7 (22.8 men, 14.9 women); paint and varnish 39.2 (27.8 men, 11.4 women); soap, candles, glycerin, etc., 51.1 (29.7 men, 21.4 women); mineral oil refining 36.6 (30.5 men, 6.1 women); other oils, greases, glue, etc., 31.2 (24.0 men).

#### Fewer Unemployed

There was also a small rise in the numbers employed in industries connected with the treatment of non-metalliferous mining products other than coal. The total figure for October, 1950, was 319.8 thousand, compared with 319.4 thousand in September and 306.9 thousand in mid-1948.

Unemployed persons (all classes) registered in the U.K. on 13 November according to the industrial analysis showed 4907 (3251 men and 1656 women) in the chemical and allied trades. This total was slightly lower than the figure on 16 October. In the treatment of non-metalliferous mining products other than coal there was also a slight reduction in the number of unemployed, the total being 3494 (2755 men and 739 women).

Placing work of the employment exchanges during the four-weeks ended 25 October 1950, showed that the following vacancies were filled in the chemicals and allied trades:—Total 4959; men (18 and over), 2890; boys (under 18), 240; women (18 and over), 1516; girls (under 18), 313. In the treatment of non-metalliferous mining products other than coal placings during the period totalled 3918.

The total number of persons enrolled on the Technical and Scientific Register at 13 November 1950, was 5442. This figure included 3905 registrants who were already in work but desired a change of employment, and 1537 who were unemployed. During the four-week period 17 October to 13 November 1950, the number of vacancies notified was 381. Vacancies filled were 244 and 359 were cancelled.

Fatal industrial accidents in November, 1950, were more numerous than in the previous month, the total of 151 comparing with a revised figure of 112 in October, and 123 for November, 1949. Despite this increase, deaths in the chemicals, oils, soap, and allied industries were only four, compared with 10 reported in October. Metal conversion and founding was the highest total, with 12, while clay, stone, cement, pottery and glass accounted for three, and textile printing, bleaching and dyeing and gas works each had one.

#### No Deaths by Poisoning

No deaths were recorded in the U.K. in November under the Factories Act, 1987, or the Lead Paint (Protection against Poisoning) Act, 1926. Total cases reported were 31, a reduction of 12 on the previous month. Details were: lead poisoning, four; aniline and chronic benzene poisoning, one each; anthrax, six: epitheliomatous ulceration (skin cancer) nine (pitch, two; tar, five; oil, two); chrome ulceration 10 (manufacture of bichromates, six; chromium plating, four).

New regulations for the grinding of metals and blasting (castings and other articles) were made by the Ministry of Labour and National Insurance for Northern Ireland during November, 1950.

The Grinding of Metals Special Regulations make some changes in regard to the sweeping or cleaning of rooms in which cleaning of castings is done, and the conditions under which the process of rumbling may be carried on. They also make exemptions in some cases to depend upon the length of time certain work is carried on in a room or at a machine instead of upon the time a particular individual is employed on that work.

The Blasting (Castings and Other Articles) Special Regulations prohibit the introduction into any blasting apparatus, as an abrasive, of sand or of any other substance containing free silica. They also prescribe the precautions to be taken (including the provision of protective clothing) where the cleaning of castings is done by "blasting," and restrict the employment of persons under 18 years of age.

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## ALTERNATIVE ZINC SOURCES

In Wales

In Scotland

FOLLOWING close on the Government restrictions on the sale and use of zinc is a decision to resume work at once on the mining of the zinc and lead deposits in the foothills of Talyfan mountain, near

The Welsh Department of the Ministry of Supply has granted a licence to the Trecastell Lead Mines, Ltd., to proceed with plans for recovering ore in the dis-used Trecastell Mine, which was closed with the drop in metal prices in 1921 and which has since partially filled with water. In the past two years the new company has carried out extensive geological surveys and tests and installed new gear and pumping apparatus. The yield is planned to reach 350 tons of ore weekly, equivalent to 50 tons of metal in roughly equal pro-portions of zinc and lead. Work will be found for 150 men.

The Trecastell Mine is believed to be the richest of its kind in North Wales. Since the present operations began, 30 men have been engaged reopening the main entrance shaft and pumping the flooded workings day and night. Pump rooms are being constructed 600 ft. below the surface so that the work can continue, and it is proposed to drive down still deeper and open up new levels. The Caernarvonshire side of the Conway Valley is riddled with bore-holes and levels made in search of lead and zinc. A number of levels were worked during the 1914-18 war at Trefriw and Bettws-y-Coed, as well as at Tre-

castell.

Another company has plans for large-scale mining of zinc and lead in part of the Gwydr Forest near Bettws-y-Coed, where there are a number of derelict mines. Surveys have already been made and the possibility of reopening and linking up the workings of various mines is envisaged.

HE serious shortage of zinc and kindred metals has focused attention on whether it would be practicable to reopen the old mines at Leadhills and Wanlockhead in Scotland. The scarcity of zinc and lead and the high prices now obtaining might change the workings into economic propositions.

Eighteen months ago the report of the Mineral Development Committee, which was presented to Parliament by the Minister of Fuel and Power, suggested a determined exploratory campaign based initially on Wanlockhead. Nothing appears to have been done about this proposal, which was made by a Scottish sub-com-mittee and accepted by the parent body.

The report of the committee states:-"The broad conclusion of the sub-committee is that a determined exploratory campaign, based initially on Wanlock-head, and extending gradually so as to open up the area of ground between the two mines at lower levels, would have a reasonable chance of proving the existence of substantial new lead-zinc resources. It is not possible on the evidence available to be more specific.

The mines at Leadhills and Wanlockhead are about two miles apart and worked the same series of veins. Leadhills has been closed for nearly 20 years, and Wan-

lockhead for 15 years.

"In any future consideration of the redevelopment of lead mining, however, this area is the most important," the report stressed.

Ore reserves at Wanlockhead were known to amount to the equivalent of about 18,750 tons of 80 per cent lead concentrates and about 12,500 tons of 45 per cent zinc concentrates, about one-half of each being reasonably certain and the remainder probable. There was no evidence concerning reserves at Leadhills.

### DEVELOPING U.S. COBALT SUPPLIES

BY the end of 1952 the United States will have access to 4,250,000 pounds of cobalt annually from domestic and Canadian ores, according to the Mining Branch of the American Institute of Mining and Metallurgical Engineers, New York City. United States consumption of cobalt immediately prior to the present national emergency was 8,000,000 pounds annually, 90 per cent of which is imported from the Belgian Congo.

New sources are being commercially exploited by the development of a process to recover cobalt from complex concen-

trates containing arsenic or nickel.
On 21 November 1950, the National Production Authority issued an order limiting consumption of cobalt to 30 per cent of previous usage by nonessential industries and by February 1951 cobalt will be restricted to defence order consumption only.

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## NEW CHEMICALS FROM SEAWEED

Problems of Application to Industry

P RODUCTION of chemicals from seaweed was advanced a stage further by the opening on 22 December of the Gulland Laboratory at the Institute of Seaweed Research, Inversek Gate, Musselburgh

Research, Inveresk Gate, Musselburgh.

The laboratory, which is designed and equipped primarily for the development of pilot scale processes, is the first semi-technical chemical laboratory to be built in Britain at a Government-aided research institute not dealing with defence prob-

Although the survey of Scotland's seaweed beds cannot be completed for some years, it is estimated that approximately 10 million tons of brown seaweed are growing between low water mark and seven fathoms in Scottish inshore waters. Of this quantity it would probably not be profitable to harvest more than 40 per cent, that is four million tons.

To conserve seaweed resources not more than a quarter of this amount should be harvested each year. As about four-fifths of this is water, there is potentially available, on a conservative estimate, over 200,000 tons of dry brown seaweed annually, if estimated at the right time

Scientific examination of Scotland's seaweed resources and their potentialities were begun by the Scottish Seaweed Research Association, in collaboration with the universities, towards the end of the war.

Already Built Up

As a result of these efforts an industry has already been built up on alginate and agar production which is manufacturing these chemicals to the value of about three-quarters of a million lb. per annum.

Encouraging as this development is, Scotland's proved seaweed resources have yet barely been touched, and if they are to be fully utilised, seaweed chemicals other than agar and the alginates must inevitably be exploited.

The work of the association's chemists has now reached a stage where a clear picture has been obtained of the type and amount of the other chemicals available.

It is now known that the 200,000 tons of dry brown seaweed potentially available each year is capable of yielding about 30,000 tons of alginic acid, a slightly larger quantity of the principal seaweed sugar mannitol, almost 40,000 tons of laminarin the seaweed starch, and over 5000 tons of a new chemical known as fuccidin.

Two of these chemicals in turn can be converted into two other sugar-like materials, namely glucose and the less well known sugar fucose. There are, in addition, smaller and as yet unassessed quantities of proteins, fats, sterols, amino acids and other chemicals.

This information is of relatively little value to industry, however, until economic outlets have been found for these commodities which is an extremely difficult problem. With the exception of mannitol and glucose, all of these chemicals have not previously been available for industrial applications.

#### Laboratory to Find Uses

It is to find possible uses with the minimum of delay that the new laboratory on its 11-acre site has been specially erected and equipped by the association.

Chemists and chemical engineers can produce these new chemicals on a pilot scale. By this means it is hoped to prepare bulk samples for industrial assessment through its member firms. It is also expected to develop economic processes for their production on a sufficiently large scale to enable an estimate of costs to be made which would be capable of transfer to the full production scale by interested industrial firms.

The laboratory, which has 2400 sq. ft. floor space, was named after the late Professor J. Masson Gulland, who until his death in 1947 was Jesse Boot Professor of chemistry at Nottingham University.

The professor was one of the first to

The professor was one of the first to visualise the need for a scientific investigation of Scotland's seaweed resources and was largely instrumental in bringing the Research Association into being. He was active in all branches of the association's work in its formative years, served on its board of management and was chairman of its chemical advisory committee.

#### Government to Take Control

At the opening ceremony, Mr. Hector McNeil, Secretary of State for Scotland. announced that next year full financial control of the activities of the Institute of Seaweed Research would be taken over by the Government. The full cost would be met from the Development Fund, and work would continue subject to a further review in 1954.

The change-over to an institute wholly financed by the Government would necessarily involve a change in the constitution

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## INSECTICIDES AND THEIR STUDY

DEVELOPMENT of synthetic organic insecticides on a large scale and the problems of their application and toxicity were discussed in the Fernhurst Lecture given by Dr. C. Potter, D.I.C., head of the department of insecticides and fungicides, Rothamsted Experimental Station, at the Royal Society of Arts last Wednesday.

#### **Problems Outlined**

Dr. Potter gave a brief account of the more important modern insecticides now in common use—DDT; benzene hexachloride; chlordane; toxaphene; aldrin and dieldrin; HETP, and TEPP; parathion; allethrin; and so on—before outlining some of the problems in the laboratory and field where the lack of knowledge about specificity is proving a severe handicap.

When searching for new insecticidal chemicals and when comparing the insecticidal activity of chemicals, whether or not they are closely related, specificity is a major factor.

There was a tendency, he said, for the organic chemist dealing with insecticides to ignore specific effects and to consider that there was such a thing as a standard representative test insect. This was a dangerous misconception, if ideas and conclusions were based on it.

Radical advances in the development of insecticides could only be achieved by very close collaboration between the organic, physical and biochemist and biologist.

One of the major differences between the

One of the major differences between the study of pharmacology and of insecticides was that the pharmacologist was concerned with the action of chemicals on one species of animal—man, while anyone studying the insecticides was concerned with many hundreds of species.

Dr. Potter emphasised that while the chemists, physical, organic, and of biological complexion were a sine qua non, their work was likely to prove sterile in the absence of a sound biological background both in the laboratory and in the field.

The emphasis he had laid on the difficulties involved in the study and application of insecticides might give the impression that he took a pessimistic view of the possibilities of real progress. He believed that if research was directed to the right channels and that the knowledge so acquired was applied in practice, there was every prospect that chemicals would play an increasingly useful part in the control of harmful insects.

However, he wished to combat the idea

that the study of insecticides merely consisted of taking chemicals out of bottles, making them up in some kind of witches' brew, squirting them on a few insects in the laboratory to see if they were killed, and, if so, then taking the chemicals into the field and scattering them all over the countryside. He also wished to dispel the fallacy that the chemist searching for chemicals ever more potent and capable of killing all living organisms, might take these into the field and eliminate every animal present, including perhaps the men who applied them.

The study of insecticides, as he saw it, was a search for precision weapons to destroy selectively harmful insects. Specificity, while it prevented many difficulties, was in fact the basis of that selectivity.

#### The Textile Institute

Election of one new Fellow and four Associates is announced by the Textile Institute. The Fellow is Dr. Zoltan Szaloki, of Oldham, who has taken out a number of textile patents and who has written several technical treatises which have been published in Czechoslovakia and Hungary. The new Associates are: Mr. G. Archer, Cullingworth, near Bradford, works chemist, M. Walker & Sons, Ltd.; M. Malcolm Chaikin, B.Sc., assistant manager, C.R.S. Woollen Works, Shanghai, China; R. S. G. Firth, assistant spinning manager, Tootal Broadhurst & Lee Co., Ltd., Bolton; and J. R. Stewart, B.Sc., Hamilton, Ontario, Canada.

#### NEW CHEMICALS FROM SEAWEED continued from page 47)

of the organisation responsible for it. The form which the new organisation would take was at present being considered.

While the association as such would come to an end, Mr. McNeil said that he was sure that all concerned with the constitution of the new body would be anxious to ensure that, in some form or other, all the valuable industrial and scientific contacts which had been built up would be preserved.

Progress, so far, had been made possible only by bringing together the skill and knowledge of botanists, chemists, engineers, and industrialists of the highest standing. That willing co-operation would be no less needed in the work which remained to be done.

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## **OUTSTANDING EVENTS OF 1950**

HE year 1950 saw considerable expansion of the British chemical industry. Helped to a large extent by American dollar investments and the progressive leadership of I.C.I., Ltd., the construction of many new factories and installations was undertaken. At Wilton, for example, the huge £22 million I.C.I. project began to take shape and by the end of the year two divisional plants had actually come into operation, for the manufacture of vital plastic materials. Large additions were made to the new Shell refinery at Stanlow. Within one year of its inception the Cabot Carbon plant was completed, Petrochemicals, Ltd., also at Stanlow. announced that, despite delays, their cracking plant at Partington would be in operation in 1951. Chemical exports went from record to record, culminating in £11 million during November. Unfortunately, events in Korea have cast a shadow over the progress made. The need for rearma-ment began to dissipate many of the new resources which it had been hoped would have been used to improve the standard of life in this country. And finally, towards the end of the year, shortages of vital materials began to make themselves Restrictions on sulphur, solvents, zinc, copper, tin, fertilisers and many other things started to inhibit the full in-dustrial life and growth of the U.K. What this year holds in store will soon be revealed, but even the most optimistic cannot predict as bright a prospect as 1950 ushered in.

Following is a summary of the year's events, listed in chronological order:—

#### JANUARY

I NCREASING exports to Canada was one of the main objectives of the new organisation formed by the merger of the Pharmaceutical Export Group with the Association of British Pharmaceutical Industry.

After three years activity a new plant was completed in Lancashire for the distillation of fatty acids by fractionation. The British patent rights were taken over from the U.S. pioneers by Hess Products, Ltd.

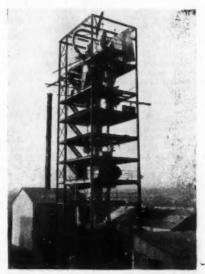
Production of acrolein by the direct oxidation of propylene was announced by the Shell Chemical Corporation as being developed at a pilot plant in Emeryville, California, U.S.A. Commercial applications of ultrasonics to industrial processes were further advanced by the introduction by Mullard Electronic Products, Ltd., of a new low frequency magnetostriction generator.

The price of good ordinary zinc was raised by £2 from £85 10s. to £87 10s. per ton delivered. Zinc oxides, in lots of not less than two tons delivered, were increased by £1 15s.

Barium salt prices were increased from the beginning of the month. Barium carbonate rose to £27 5s. per ton delivered, two-ton lots and barium sulphate (dry blane fixe) precipitated was increased to £29 10s., delivered (four-ton lots), and £29 15s., delivered (two-ton lots).

Amalgamation of the mica, rubber and sundry material directorates was announced as from 2 January.

Removal of import restrictions on many chemical and allied products was announced by the French Government in the



[Courtesy of Hess Products, Ltd

Distillation unit of Hess fatty acid plant

Journal Official. The exemptions were in accordance with the OEEC decisions to liberalise European trade.

Uranium ore occurrences at Rum Jungle, 60 miles south of Darwin were confirmed by geologists of the Australian Bureau of

Mineral Resources.

A new monthly journal dealing with recent work in some branch of food or agriculture, Journal of the Science of Food and Agriculture was started by the Society of Chemical Industry.

#### H<sub>2</sub> SO<sub>7</sub> Control Announced

Sulphuric acid control by the Board of Trade was announced to end on 31 January. Import and distribution of raw materials for the manufacture of sulphuric acid were assumed by the National Sulphuric Acid Association. Ltd.

phuric Acid Association, Ltd.
Renewed suggestions that "any appropriate sections" of the chemical industry might be placed under public ownership if a Labour Government were returned to power were contained in the Labour Party manifesto "Let Us Win Through

Together."

Reorganisation was announced of the home side of the Board of Trade with a view to reducing the number of divisions in the board, with which a single industry or firm has to deal. The Raw Materials Department and Priorities Division ceased to exist as separate entities and their functions were merged in the industrial work of the Industries and Manufactures Divisions. Organic and inorganic chemicals were in Division IM<sub>2</sub>B which also included: fertilisers; rubber and tyres; potterty; miscellaneous commodities (including china clay); and consumer-goods industries (including laundries).

The allocation of lithopone manufactured in the United Kingdom was freed from control. Distribution of imported lithopone had been previously freed. Increased prices for paraffin wax were

Increased prices for paraffin wax were announced by Shell-Mex and B.P., Ltd. Charges for one-ton lots and upwards were from £68 5s. to £101 17s. 6d. according to grade. The price of scale in one-ton lots was £51 17s. 6d. per ton.

The Government of India set up an Atomic Energy Commission which is advised by a Board of Research consisting of nine scientists, and by a Cosmic Ray Re-

search Committee.
Successful synthesis of mica was achieved in the U.S.A. by members of the U.S.

Bureau of Standards.

Withdrawal was announced of the petition of suspension and interdict made by Ben Nevis Distillery (Fort William), Ltd., and Joseph William Hobbs against the North British Aluminium Co., thus closing one of the longest court cases in recent years. Counsel for the petitioners were now satisfied that progress was being made with remedial work to prevent discharge of fluorine fumes.

The rôle of chemistry and the chemical industries in the Festival of Britain was outlined. Scientific, chemical and industrial exhibits will be shaped by expert advisory committees to include such authorities as Sir Robert Robinson. Among the industrial organisations, the British Plastics Federation will take a very active part.

A pledge to bring nationalisation to a full stop was the keynote of the manifesto "This is the Road," issued by the Con-

servative party.

Chemical exports in 1949 attained a value of over £86 million, compared with £83.58 million in the previous year and £67.4 million in 1948.

A new element, No. 97, in the atomic scale, tentatively known as berkelium, was produced in a cyclotron at the University

of California.

The Engineering Equipment User's Association, to provide a means for exchanging information on the standardisation of engineering equipment which they use in common, was formed by five British companies in the process industries field. These were: Anglo-Iranian Oil, Ltd.; Courtaulds, Ltd.; I.C.I., Ltd.; Lever Brothers and Unilever, Ltd.; and Shell Petroleum Co., Ltd.

Zinc prices were reduced by £2 to £85 10s, per ton. The various grades of zinc oxides were also reduced by £1 15s.

per ton.

#### Licensing Restrictions Go

Removal of important licensing restrictions from a further range of goods became effective in accordance with the agreement between the Government and the OEEC. Among the items freed from import restrictions were:— acid sodium pyrophosphate; carmine; compounds (not including ores or minerals) of thorium, cerium and other rare earth metals; compounds (not including ores or minerals) of molybdenum and vanadium; lanoline; and magnesium glycero phosphate.

Personal: In the New Year Honours list distinctions for industry and research included the following: SIR STEPHEN BILSLAND, a principal figure in the iron and steel industry, was created a baron. C.B.E.: F. KIDD, director of food investigation, DSIR; PROF. A. M. TYNDALL, chairman, National Physical Laboratory, executive committee. O.B.E. (Civil Division): H. T. CRANFIELD provincial advisory chemist (soils), Ministry of Agriculture;

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J. V. Foll, managing director, Muirhead & Co., Ltd.; T. Goodey, senior principal scientific officer, Rothamsted experimental station; E. Griffiths, senior principal scientific officer DSIR; H. Herworth, delegate managing director, Imperial Chemical Pharmaceuticals, Ltd.; J. G. Peare, director, British Cast Iron Research Association.

DR. F. D. RICHARDSON was appointed Nuffield Research Fellow in extraction metallurgy at the Royal School of Mines, London. The council of the Institution of Electrical Engineers awarded the Faraday Medal to SIR JAMES CHADWICK. SIR HENRY DALE was elected president of the British Council, MR. JUSTICE LLOYD JACOB began his work as the Patents Judge. MR. J. NEWBY, representing Great Britain, was elected chairman at the third annual conference of the International Association for the Exchange of Students for Technical Experience.

Obituary: Dr. T. Lewis Bailey; Mr. W. G. Feakes; Dr. A. E. M. Gillam; Mr. A. Glynne Lobley.

#### **FEBRUARY**

THE Association of British Chemical Manufacturers announced the publication of the "Report on the Chemical Industry," which was its response to the request made to it in September 1948, by the president of the Board of Trade for a "Survey of the whole of the chemical industry." It was heralded as the only authoritative attempt to define the chemical industry.

The development was announced of a new X-ray microscope by scientists of the (U.S.) General Electric Company, which is claimed not to require samples under study to be in a high vacuum, as does the electron microscope.

Monsanto Chemicals, Ltd., announced that it had purchased from the National Aluminate Corporation of America its patent rights in the U.K. pertaining to the manufacture of the colloidal dispersions of silica which are sold in the U.S.A. under the trade name of Nalcoag.

Within three months of streptomycin becoming available on prescription, Glaxo Laboratories, Ltd., announced a price reduction of 1s. to 6s, per vial.

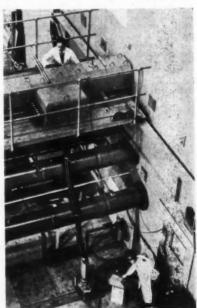
Work on the fundamental problems of the industry was begun at the new laboratories of the British Gelatine and Glue Research Association at 2-4 Dalmery Avenue, Holloway, London, N.7.

The formation was announced of a cooperative research group for the fertiliser industry called the Fertiliser Research Association, a company limited by guarantee. The decision of the Monsanto companies in Britain and America to collaborate in India was made known on the occasion of the formation of Monsanto Chemicals of India, Ltd., with headquarters in Bombay, to be jointly controlled by the British company and the Monsanto Chemical Company in the U.S.A.

The acceptance of a patent specification embodying the use of neutrons to produce permanent colour change in diamonds, was announced.

The findings of the British Non-Ferrous Metals Research Association, based on several years' research, on the behaviour of copper in supply waters, were published, and indicated that carbonaceous films were responsible for at least three-quarters of the cold water pipe failures examined.

Alley & MacLellan, Ltd., compressor manufacturers, of Polmadie, Glasgow, completed an arrangement with Dresser Industries of America and their subsidiary, Clarke Bros., of Olean, New York, which enabled the Scottish firm to manufacture under licence in Glasgow, the latter's special oilfield type of gas compressor.



[Crown copyright

Removing irradiated materials from Britain's largest atomic pile, BEPO at Harwell

U.K. chemical exports in February (£6,851,945) were worth about £1 million less than in January (£7,984,581), but showed an increase of more than £100,000 over the February, 1949 total of £6,737,432. The quality of that achievement was accentuated by the heavy recessions in one or two traditional sources of revenue, of which the Indian market was the outstanding example.

The Research Association of British Rubber Manufacturers commemorated 30

vears of work.

#### **Technical Committee Formed**

A technical committee was appointed by the British Standards Institution to prepare standards for the simplified nomenclature of insecticidal and fungicidal chemicals and other pest control products.

New laboratories of the British Non-Ferrous Metals Research Association, in Euston Street, London, N.W., were opened by Sir Ben Lockspeiser, secretary of the DSIR.

One of the impediments to the full development of the carbon black industry in the U.K. was relieved by the increase by the ECA, from \$850,000 to \$2,025,000, of the amount of currency for which convertibility will be guaranteed in respect of the undertaking by Godfrey L. Cabot, Inc., to establish a plant at Ellesmere Port. Cheshire.

The very large increase recently made in U.K. production of streptomycin was reflected in the widening of the basis of distribution, permitting deliveries to be

made to doctors and chemists.

A report of the first year's work with Britain's second atomic pile (Bepo) at Harwell, issued by the Ministry of Supply. showed that in November 1948, it produced 338 samples of radioisotopes (the elements were not mentioned) which were distri-buted and used in these proportions: medical uses 173, universities 30, industries 13, air deliveries overseas 57, internal use at AERE 65. Industry thus employed less than 4 per cent of the total.

#### Isotope Development Company

A new company was incorporated, Isotope Developments, Ltd., which was believed to be the first commercial firm to act as consultants and suppliers of radio-active isotopes for industry and agri-

The Société Minière at Métallurgique de Pennaroya was stated in a report from Paris to have concluded an agreement with the Ministry of Supply for the delivery to Britain of 18.000 tons of lead.

To determine minute traces of fumigants and other insecticides present in treated foodstuffs and in insects, work was reported to have been started on the use of radioactive materials in a specially equipped DSIR laboratory, where initial experiments were being carried out, with the fumigant methyl bromide labelled with radioactive bromine of half-life 34 hours (Br82).

Personal: Dr. J. Pearson was appointed head of the chemistry department of the British Iron and Steel Research Association in succession to Dr. F. D. Richardson. Mr. C. W. ROBINSON resigned from the secretaryship of the Association of British Pharmaceutical Industry in order to join the board of Evans Medical Supplies, Ltd., later in the year, as full-time pharmaceutical development director. The HON. R. M. PRESTON was elected chairman of the council of the British Non-Ferrous Metals Research Association in succession to Sir John Greenly; DR. MAURICE COOK became chairman of

the research board.

Obituary: Mr. H. Elias Buc, Dr. G. S. Cruikshanks, Mr. James Laing, Dr. Jaro-

slav Kulhanek.

#### MARCH

MENDMENT of the definition of A edible gelatin and the limits of its metallic contamination was the subject of a report by the Food Standards Committee which was approved for publication by the Minister of Food.

Exports of chemicals in March, at £8,274.390, showed a marked improvement over February (£6,851,945) and March 1949 (£7,571,228). This better result was helped considerably by the greater volume of trade being done with the South American countries and Scandinavia.

An opportunity was provided, by the London Exhibition of French Scientific Instruments, held at the Science Museum, South Kensington, of seeing how our friends and neighbours on the Continent are tackling current scientific problems.

New regulations affecting metal casting procedure were made by the Minister of Labour, prohibiting the use as a parting material of any substance containing compounds of silicon, calculated as silica, exceeding 3 per cent, or of dust or other product of fettling or blasting.

A new electronic torch capable of melting firebrick and even tungsten (at 3370°) was announced as being developed at the research laboratory of the (U.S.) General Electric Company, at Schenectady, New

An exhibition of its technical literature was held in London by Imperial Chemical Industries, Ltd. Every year the company publishes some 800 new books and brock to st hund The reduc the d

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brochures ranging from four-page leaflets to standard works of reference of several hundred pages.

The price of United Kingdom lead was reduced by £9 to £88 a ton. This brought the domestic cost of the metal down to its

pre-devaluation level.

A Crown grant of £169,000 was made to Alumite and Alzak, Ltd., for inventions and secret processes used during the war for the protection of aluminium and aluminium alloys. The processes were anodising and ancillary treatments which enabled industry to do without chromic acid. In all 16 patents were made available to the Crown.

Clear cellulose lacquer with which the walls of the corridor had been sprayed were alleged to have been the cause of rapid spreading of fire on an Edinburgh-

King's Cross express.

Professor N. V. Sidgwick's long awaited work, "The Chemical Elements and Their Compounds" was published, and was en-

thusiastically received.

The capacity of large commercial interests to encourage matters not specifically connected with their own requirements was evidenced by the publication of "The Colour of Chivalry" by Imperial Chemical Industries, Ltd. The book, presents vividly and accurately examples of armorial bearings. These were originally reproduced for publication in overseas periodicals to make known I.C.I.'s capacity as a producer of colours.

#### **Indian Industry Protected**

Protection of India's sodash ash industry until March 1953 was agreed to by the Government of India on the recommenda-tions of the Tariff Board.

The manufacture of penicillin in India as a state enterprise with the co-operation of a foreign firm was announced by Dr. J. N. Ray, deputy director general of Industries and Supply, Government of India.

A new research unit for antibiotics was set up by Glaxo Laboratories at Sefton

Park, near Stoke Poges, Bucks.

Criticism of the glassware manufacturers was made by Mr. Aneurin Bevan in the House of Commons. The Minister of Health alleged that no tenders could be obtained from British manufacturers, which had necessitated buying from Germany.

Lead price was reduced by £4 to £84

a ton.

An appeal for £500,000 for a building fund to extend the textile industries Shirley Institute at Didsbury, Manchester, was launched by the British Cotton Industry Research Association.



Dr. E. H. T. Hoblyn

The domestic price of zinc was raised by £2 to £89 10s. a ton. Zinc oxide prices were increased accordingly by £1 15s. per ton for two-ton lots, delivered.

Permission to erect at Whitehaven an additional factory building of 70,500 sq. ft. was granted by the Board of Trade to Marchon Products, Ltd., to cope with the expanding trade in synthetic detergents.

Another new element, No. 98 in the periodic table, was created by atomic bombardment at California University. The heaviest chemical element known, it has been named californium, in honour of

the university.

A united chemical profession, was stated to be the aim of the British Association of Chemists at its annual dinner held in London. Dr. Herbert Levinstein, president, was in the chair and guests included the presidents of the Royal Society, the Chemical Society, the Royal Institute of Chemistry, the Society of Chemical Industry and the Institution of Chemical Engineers.

The Alkali, etc., Works Order, 1950 came into operation on March 25. Volatile organic sulphur compounds and fluorine was added to the list of noxious gases, but

carbon black was not affected.

Personal: Dr. W. H. GARRETT, director of Monsanto Chemicals, Ltd., was presented with the Liverpool University Chemical Society's medal. The Willard Gibbs Medal in Chemistry, one of the highest honours in American science was awarded to Professor Carl Shipp Marvel of the University of Illinois. SIR ROBERT Sinclair was nominated to serve as president of the Federation of British Industries for a second year. Dr. E. H. T. HOBLYN, was appointed director of the British Chemical Plant Manufacturers Association. Professor Nils Gralen, one

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of Sweden's foremost scientists read a paper on the "Cuticle of Wool" to the Society of Dyers and Colourists at Bradford, Dr. W. D. Scorr was appointed deputy managing director of Monsanto Chemicals, Ltd. Twenty-five years service as general secretary of the British Association of Chemists was completed this month by Mr. C. B. WOODLEY.

by Mr. C. B. WOODLEY.

Obituary: Mr. Arnold Cleminson; Mr. J. E. Nash; Sir Norman Haworth; Dr. Arthur Dempster; Mr. Robert McLean; Sir Frederick Stewart.

#### APRIL

Q UESTIONS about the purchase of glassware from Germany were asked in the House of Commons. The British Chemical Ware Manufacturers' Association stated that, contrary to the Minister of Health's allegations, no retailer had been asked to tender.

Iodisation of edible salt as a prevention of goitre was recommended in the report of the Medical Research Council.

A project to construct a new oil refinery at Coryton, in the Thames estuary, was announced by the boards of Powell Duffryn, Ltd., and of the Socony-Vacuum Oil Company, Inc., New York. Synthetic detergents and their effect on

Synthetic detergents and their effect on sewage plants were discussed at a meeting of the Bradford Sewage Committee. It was pointed out that increasing use of synthetic detergents might mean the clogging of filters and might render impossible

the extraction of wool grease.

The Stress Analysis Group of the Institute of Physics held its fourth annual conference at University College, London.

Suspension of lead rationing was announced as from April 1, due to better availability of supplies.

Postponement was announced of a £3 million scheme to establish an oil refinery at Tynemouth. The decision was a result of the national policy of restriction on capital expenditure.

Trading profit of the Anchor Chemical Co., Ltd., for the year was £84,401 (including a profit of £14,679 of an exceptional nature). Final dividend of 263 per cent was recommended on ordinary shares (40 per cent for the year).

Chemical exports in April totalled £7,128,152. Although this was £1,145,638 less than in March, it still compared favourably with the levels of £6.85 million in February and £6.89 million in April 1949. Imports in the chemical group representing a value of £2,626,423 also cost more than in the previous April.

cost more than in the previous April.

The diverse range of interests served by
the British Chemical Plant Manufacturers'
Association was recorded in the report of
executive committee for 1949 presented at
its annual general meeting held in London.

Eight separate research establishments of the Ministry of Supply co-operated in the Physical Society Exhibition which drew large crowds to the imperial College, South Kensington, London, to see the new or modified equipment displayed.

The agreement whereby Thorium, Ltd., operated the Radiochemical Centre, Amersham, Bucks., as agents for the Ministry of Supply, ended on 31 March. The Ministry continued to carry on the business of the centre direct.





John Lysaght's Scunthorpe Works, Ltd., details of which were announced in our issue of 1 April, 1950. (Left) the company's new blast furnace, in course of construction, and (right) the rolling mill building, in which is housed the Morgan continuous billet mill

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Imperial Chemical Industries, Ltd., acquired about 70 per cent of the common stock of Arnold Hoffman and Co., an oldestablished U.S. chemical undertaking of Rhode Island.

Construction of a new atomic energy establishment at Aldermaston, near Reading, was announced by the Ministry of Supply. The work was expected to take some years and would employ a substantial labour force.

Formation of a new company, Forth Chemicals, Ltd., was announced by British Petroleum Chemicals, Ltd. (jointly owned by the Anglo-Iranian Oil Co., Ltd., and the Distillers Co., Ltd.), and Monsanto Chemicals, Ltd. The new company will be mainly concerned with the manufacture of monomeric styrene.

During the month it was announced that a modern nitric acid plant, the third owned by the Dutch State coalmines, and erected at Geelen (Limbourg province), would shortly be in operation. The plant is said to have a capacity of about 820 tons of 55 per cent nitric acid, or some 100 tons of nitrogen daily.

A new factory to produce synthetic detergents and polyvinyl chloride products was opened at Pernis, Holland, by the Bataafche Petroleum Mij., a subsidiary of the Royal Dutch Shell group.

New fees for patents for inventions came into force on 1 April, under the Patents and Registered Designs Appeal Tribunal Fees Order, 1950.

A sum of £1000 to endow a Fellowship in the fields of tinctorial or textile chemistry was received by Bradford Technical College from the Bradford Dyers' Association.

Application of radioactive element technique to production and research in industry was gauged in a questionnaire sent out by a Surrey firm. Of 150 firms which expressed their willingness to take advantage of this technique, 23 were engineers, followed by chemicals. which were integrated with metallurgical and food, each with 14.

The first section of the Electrochemical Society of America to be founded abroad was opened at Bangalore, India, when the value of electrochemical processes to industry were reviewed.

#### International Unions Discussed

In a talk on "Towards International Collaboration in Science," Dr. L. H. Lampitt traced the history and develop-ment of the international unions combining for better understanding, particu-larly the International Union of Pure and Applied Chemistry.
Chemical engineering needs

were



diffraction camera Electron bu Edwards and Co. (London), Ltd., which was described in our Laboratory Furnishings Number of 29 April

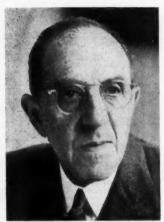
emphasised at the annual general meeting and dinner of the Institution of Chemical Engineers held in London on 14 April. The president, Professor D. M. Newitt, emphasised the lack of facilities required for research. He said that as a result of representations to the Government, its vice-president, Mr. W. H. Cremer, had been appointed to the committee set up to discuss the matter.

Judgment was given against the U.S. Government in the test damage suit filed to determine liability for the ammonium nitrate explosion at Texas City in April 1947.

New methods of carrying radioactive material in aircraft were described in a notice issued by the Ministry of Civil Aviation.

The interest attached to the quantitative production of oxygen for industrial purposes was widened by a conference held in Paris to discuss the possibilities of cooperative research in the field of tonnage oxygen.

Reduction by 1d. per lb. in the price of dibutyl phthalate was announced by British Industrial Solvents, Ltd.



Sir Ian Heilbron, who was appointed chairman of the Advisory Council for Scientific and Industrial Research during the month of April

Personal: Dr. E. Kr Rideal, lately director of the Davy Faraday Research Laboratory and Fullerian professor of chemistry in the Royal Institution, was appointed to the chair of chemistry, King's College, University of London; Mr. Barrie Heath was appointed a managing director of Powell Duffryn Carbon Products, Ltd.; Mr. Norman Sheldon was re-elected chairman of the British Chemical Ware Manufacturers' Association, Ltd. Sir John Cockroft, director of the Atomic Energy Research Establishment, was decorated, in Paris, with the cross of a Chevalier of the Legion of Honour; Mr. H. N. Ridley was awarded the Linnean Medal for 1950; Professor T. P. Hilditch was elected hon. vice-chairman of the North-Western Section of the RIC; the title of Fellow of University College, London, was conferred on Professor J. W. Cook, president, RIC; Dr. E. W. Titterton, of the Atomic Energy Research Establishment, Harwell, was appointed to a chair of physics at the Australian National University; Mr. L. O. Kekwick was re-elected as chairman of the London Section of the Oil and Colour Chemists' Association.

Obituary: Professor C. S. Gibson, Dr. J. A. Crowther, Mr. H. J. G. Watkins, Dr. Frederick Thomas Peirce, Mr. Joseph Sykes.

#### MAY

THE essential character of chemical knowledge in the vital fields of

medicine and surgery—as well as chemical engineering—was testified to by speakers at the annual dinner of the Chemical Engineering Group of the Society of Chemical Industry in London. Lord Webb-Johnson referred to Professor Dunn's work on hormones and said that this had opened the way to possible methods of treating a dread disease.

Over 300 delegates attended the 1950 annual series of meetings held by the International Superphosphate Manufacturers' Association in Madrid.

A new process in the manufacture of steel—oxygen lancing—was described by the British Iron and Steel Federation. By the use of this technique it was claimed that Sheffield steelmakers had speeded up their method of producing stainless steel, improved its quality and had reduced consumption of the expensive alloy ferrochromium.

Attention was drawn to the part played by I.C.I. research in contributing to fundamental and practical advancement. In the 23rd annual report of I.C.I., Ltd., it was stated that the company spent £112,000 annually in the establishment of post-graduate research fellowships, grants for apparatus and chemicals and the support of special researches of a fundamental character.

An electronic polarometer, designed to give greater accuracy and higher operating speed than existing polarographs, was described in a paper delivered to the ti



THE CHEMICAL AGE stand at the Olympia section of the BIF

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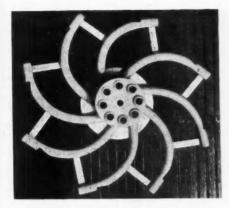
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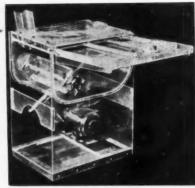
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[Courtesy of I.C.I. Ltd.

The growing employment of plastics in industry was demonstrated at the Earls Court section of the B.I.F. Left: A metering wheel in Alkathene (Rediweld, Ltd.), and (right) a photo-engraving etcher made of Perspex (D. O. Nichol, Ltd.)

Physical Methods Group of the Society of Public Analysts.

The new laboratories of the British Leather Manufacturers' Research Association were officially opened at Egham, Surrey, by Sir Ben Lockspeiser, secretary of DSIR.

The first U.K. experiments in underground gasification were held at Newman Spinney, near Sheffield. The work was only partly successful in that the coal seam did not at first ignite and then only with a low rate of combustion.

Recent advances in industrial and research instruments were illustrated at the annual conversazione of the Royal Society. Of particular interest was an infra-red spectrometer developed by Marconi, Ltd., and the Anglo-Iranian Oil Company, and a medium-scale method of preparing iron and iron alloys of high purity, described by the Metallurgy Division of the National Physical Laboratory.

Good overseas business was reported from the chemical engineering sections of the BIF at Castle Bromwich.

The King and Queen inspected the new headquarters of the National Institute of Medical Research at Ridgeway, Mill Hill. A large part of this institute is devoted to biochemistry and to chemotherapy.

Officers and members of the French Société de Chimie Industrielle visited Britain. A cordial welcome was given to the president, M. Robert Bienaimé, and his group, who were entertained by some of the principal chemical organisations and the Society of Chemical Industry.

A total membership of over 5000 was reached by the Textile Institute when 40 new members were elected to the Institute on 17 May.

New laboratories of the Coal Tar Research Association were opened at Gomersal, Leeds, by Sir John Anderson.

The price of fertilisers was increased to cover higher delivery costs due to the increase in rail rates.

The first 18 of a series of new standards for solvents and allied products was issued by the British Standards Institution.

Heptafluorobutyric acid, a new intermediate suitable for use in fluorocarbon syntheses, was described in THE CHEMICAL AGE. The account described some of the derivatives which can be prepared from it.

Personal: Mr. W. F. MITCHELL was appointed head of a new department created by the Shell Petroleum Co., Ltd., to administer the company's chemical enterprises throughout the world, except Canada and the U.S.A. Mr. J. H. Brennan, chief metallurgist of the Union Carbide and Carbon Corporation, was the 20th recipient of the Jacob F. Schoelkopf Medal, bestowed annually by the American Chemical Society for outstanding chemical achievements. The 1950 award was "in recognition of his contributions to the metallurgical practices of the ferro-alloy industry." Professor John Read, winner of the 1949 Cortina-Ulisse European prize of 1 million lire for his book "A Direct Entry to Organic Chemistry," used some of the prize money to finance a lecture tour in Italy. Professor Read lectured to scientists in 11 major Italian cities on



Mr. W. F. Mitchell

"Historical Science as an Instrument of

Obituary: Dr. G. W. Robinson, Dr. H. A. Dickie, Mr. Gavin Lawson, Mr. G. Livings.

#### JUNE

A PLAN to construct a factory for the production of phosphorus was announced by Albright & Wilson, Ltd. The factory, which would cost £1 million, was to be built at Portishead, near Bristol.

The purchase of 350 acres at Alderley Park, near Manchester, for the purpose of building new research laboratories for its pharmaceuticals division, was announced by I.C.I., Ltd.

It was urged by a jury at Richmond, Yorkshire, that the practice of using dinitro-ortho cresol weed killer should be the subject of consideration by the highest authority. The jury had been holding an inquest into the deaths of two agricultural spraying operatives and returned a verdict that death was caused by poisoning by dinitro-ortho cresol received while the men were following their occupation.

The Royal Dutch Petroleum Company celebrated its Diamond Jubilee, beginning with a dinner at The Hague at which Prince Bernhardt of the Netherlands was guest of honour.

Speaking at the Mechanical Handling Exhibition at Olympia, London, Dr. W. H. Garrett, a director of Monsanto Chemicals, Ltd., said that the primary objective of mechanical handling methods at the moment was the reduction of costs. Full advantage must be taken of the reduction in manual labour made possible by machines.

A gift of £100,000 to the Weizmann Institute of Science in Rehovoth, Israel, was made by Mr. Isaac Wolfson. The donor stated that the work of the institute was contributing not only to the future of Israel, but to the advancement of science in every part of the world.

science in every part of the world.

The town of Widnes commemorated its centenary as a centre of chemical production with a luncheon given to people pro-



The analytical section of the Dunlop Research Centre which was opened in June. The enlarged laboratories included most up-to-date equipment for a wide range of investigation not only in the chemistry of rubber and allied substances, but also in synthetic polymers and plastics

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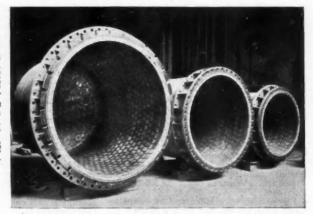
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Trends in German technique were noticeable at the Achema and Dechema (Exhibition for Chemical Apparatus Systems and German Society for Chemical Apparatus held in Systems) Frankfort in July. Vats lined with 65 per cent silicon plates, welded by a special process by the Eisenwerke Co.



minent in Widnes and in local and neighbouring chemical industries. Sir Frederick Bain, deputy chairman of I.C.I., Ltd., outlining the progress made there in the last hundred years, referred to the many great leaders of Widnes chemical industry and concluded by saying that the hereditary skill of the Widnes chemical worker would ensure the continued development of the industry in the town.

The price of zinc rose from £111 10s, to

The price of zinc rose from £111 10s. to £127 10s. per ton delivered.

The second of two giant water cooling towers to serve the £12 million Anglo-Iranian Oil refinery development at Grangemouth was completed on 9 June.

A new method for the polarographic

A new method for the polarographic determination of aluminium was described by Dr. G. Jessup to the Physical Methods Group of the Society of Public Analysts at Cambridge. Unlike the usual procedure for the estimation of aluminium,

which depends on the direct reduction of the ion in a slightly acid solution, the new scheme proposed by Dr. Jessup involved catalytic reduction in the presence of a large excess of bromate.

The British Electrical Power Convention Exhibition was held at Harrogate from

Personal: SIR FREDERICK BRUNDRETT took up the post of deputy scientific adviser to the Ministry of Defence so as to assist SIR HENRY TIZARD, who was to carry out this responsibility on a part-time basis only. COLONEL M. A. McEvoy, managing director of Bamag, Ltd., left for a tour of the Middle East, Pakistan and India to inspect some of the chemical and vegetable oil plants recently completed by his company in those countries. The principal award to a scientist in the King's Birthday Honours List was the promotion to Knight Commander in the



Mr. J. S. Brough (left) who was appointed manager of engineering to Monsanto Chemicals, Ltd. He joined the company as a chemical engineer at Ruabon in 1945.

Mr. George Legh-Jones (right) managing director, Shell Transport and Trading Co., Ltd., who was created a knight in the King's Birthday Honours



Order of the Bath of SIR BEN LOCKSPEISER, secretary, DSIR. Mr. George Legh Jones, managing director of Shell Transport and Trading Co., Ltd., was made a Knight. MR. T. H. REDFERN was elected as president of the Federation of British Rubber Manufacturers' Associations for 1950-51. MR. J. S. BROUGH became the new manager of engineering to Monsanto Chemicals, Ltd.

Obituary: Dr. Fabius Gross.

#### JULY

BRITISH exports of chemicals in July reached the record total of £9,319,269. This was an increase of nearly £2,900,000 compared with July 1949. Exports of nonferrous metals were also a record— £7,366,809, compared with £4,539,070 in July 1949.

Eleven men were killed and 84 incapacitated when gas escaped from a furnace at the Consett Iron Company's works at

Consett on 1 July, An increase in the price of industrial and agricultural Chilean nitrate was announced by the Nitrate Corporation of Chile at the

beginning of the month. Bakelite, Ltd., announced that £100,000 was to be set aside for research.

A Goodrich subsidiary company Cleveland claimed to have developed a chemical to protect crops from the ravages of rabbits and rodents.

Commonwealth scientists met at Cambridge to discuss the promotion of scientific research in all branches of defence by closer collaboration between Britain and the Dominions.

The first international microchemical congress was held in Graz, Austria, from 2-6 July.

The end of soap rationing, to take place on 10 September, was announced by the Ministry of Food.

Illustrative of the ever-increasing uses for metals and their alloys was an exhibition "Metals in the Service of Mankind," opened by Princess Margaret at the Science Museum, South Kensington.

Recommendations for a smokeless zone to be established in the centre of Manchester were made to the council by the city's health committee.

Work on radioactive carbon by Ministry of Supply scientists at the Amersham radiochemical centre was one of many interesting exhibits at the sixth Inter-national Congress of Radiology held in

A new rubber road surface was reported to be under test at the Speke factory of the Dunlop organisation.

Plans to increase the laboratory space

and to install modern testing equipment at the Abington research centre were announced by the British Welding Research Association.

The Indian Government forecast that India expected to attain self-sufficiency by

Fourteen firms, including three British and two Dominion companies were cited in a civil anti-trust suit filed by the U.S. Department of Justice at Pittsburgh. The firms concerned were alleged to have been associated in an attempt to control the world market in rolling mill equipment.

The first substantial rise in fertiliser prices for 30 years came into effect on July.

The fourth World Power Conference was held in London under the chairmanship of Sir Harold Hartley. About 16,700 delegates from 47 countries were present. The technical sessions included the reading of 156 papers.

Coal production during July was affected

by a strike of Scottish miners. Changes in export licensing control. effective from July 8, were announced.

The Ministry of Agriculture decided to set up a working party to review the possibilities of human injury while using insecticides and weedkillers. This followed concern felt over the death of two operatives after prolonged exposure to a dinitroorthocresol preparation.

The second Oil Shale and Cannel Coal Conference was held in Glasgow.

Inflated metal costs, due to Government bulk buying, was the predominant theme of a speech made by Mr. William H. Henman, following his re-election as president of the British Non-Ferrous Metals Federation. Mr. Henman, however, paid tribute to the excellent understanding which existed between the Ministry of Supply and the representatives of the federation.

#### Motion Defeated

The rebate or deduction in home produced hydrocarbon oils was the subject of much discussion during the consideration of the amended Finance Bill. The motion by Mr. Selwyn Lloyd, that a guarantee should be given that any such deduction would not be diminished for a period of twelve years, was defeated by 275 votes to 252.

The start of a \$850,000 programme for the expansion and production of new materials was announced by Monsanto (Canada), Ltd. The plan called, among other things, for the installation of equipment to manufacture for the first time in Canada butylated melamine and urea

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nto ong ipin rea Production of the first polystyrene to be made commercially in the United Kingdom was begun at the Monsanto works at Newport. The Monsanto product, Lustrex, would first be made from imported styrene but is was announced that Forth Chemicals, Ltd., would eventually begin the making of styrene monomer at a new plant to be erected in Scotland.

"Operational Research?" was the subject of a book published by the Manchester Joint Research Council, in which facts and opinions on research were given by many authoritative workers, among them Professor P. M. S. Blackett and Sir Raymond

Streat.

It was announced that the Government of Ceylon is to establish a vegetable oil factory in July 1951 for the manufacture of processed products from coconuts and oil seed.

The Pulsometer Engineering Co., Ltd. celebrated three quarters of a century of progress by an "open" day and sporting

activities.

The A.P.V. Co., Ltd. reported a net profit of £296,363 for the year ending 31 December 1949.

The Distillers Co., Ltd. announced that their consolidated profits in the year ended 31 March were £12,837,691.

A plan to build a £1 million phosphorus

factory at Portishead, near Bristol, was announced by Albright & Wilson, Ltd.

It was reported that Imperial Chemical (Pharmaceuticals), Ltd., had purchased 350 acres at Alderley Park, near Manchester, for the purpose of extending their research and administrative facilities.

Personal: SIR IAN HEILBRON, chairman of the Advisory Council of Scientific and Industrial Research was elected a foreign of the Royal Netherlands member Academy of Science and Letters, Pro-FESSOR M. L. E. Oliphant, prior to leaving for Australia, paid tribute to Birmingham University, and prophesied that it might become the premier university in the country in the field of science. Mr. R. MATHER succeeded Sir Andrew McCance as chairman of the British Iron and Steel Research Association. SIR WILLIAM LARKE was re-elected as president of the British Welding Research Association. SIR JOHN ANDERSON was elected president of

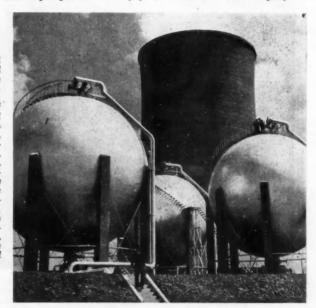
Obituary: Major E. F. Campbell, Mr. N.

Gunn, Dr. D. H. Bangham,

#### **AUGUST**

THE hydrogen bomb contract was awarded to the Du Pont de Nemours Chemical Company; the U.S. Government to pay all costs and the company to

The three spherical storage tanks erected on the site of Shell's new refinery at Stan-low, Ellesmere Port. low, Ellesmere They were the first of this type to be supplied to an oil refinery in Britain. The tanks, Britain. tured by Wnessen,
Darlington, designed and manufacmeasure 35 ft. in diameter and each holds 140,000 gal. of butane gas stored at a working pressure of 70 p.s.i. In the background is the 341 ft. high concrete cooling tower, claimed to be the largest in the world



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receive one dollar as token payment for their services.

Plans to produce vital materials not at present manufactured in the U.K. were announced. Parke, Davis & Co. reported that their new factory to be built at Hounslow would include the manufacture of chloromycetin as part of the production plans. Albright & Wilson stated that their company was to produce all silicone materials at present imported into Great Britain. It was expected that production

would start in about two years. Chemical exports in August in exceeded £9 million.

Strong local opposition was shown to the erection of a phosphorus factory at Portishead, near Bristol.

The scope for glass as a constructional material for chemical plant was emphasised by Mr. B. H. Turpin, director of Quickfit & Quartz, Ltd., in an address to the 7th Scandinavian Chemists' Congress at Helsinki. Mr. Turpin stressed that the modern tendency in chemical plant design seemed to be towards the use of smaller and more flexible units rather than towards large single purpose units. A contract to supply \$1 million worth

of British domestic polishes was awarded to the Furmoto Chemical Co., of London, at the first U.S. International Trade Fair.

Simon-Carves, Ltd., secured a £2 million contract to manufacture coal preparation plant for a group of Turkish

The price of electrolytic copper rose to £202 per ton. Lead also rose from £104 to £112 a ton.

A team of specialists left England to study U.S. methods of metal finishing.

The British Oxygen Co., Ltd., opened its Scottish school for the training of welders.

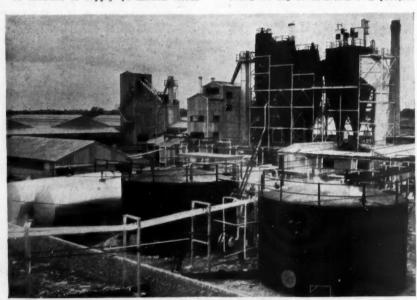
A new metallurgical institute was opened at Ljubljana, Jugoslavia.

The new Cabot carbon plant, at Stanlow, was opened by Mr. Harold Wilson, President of the Board of Trade.

The development of two new drugs, Nimbidein and sodium nimbidinate, to combat certain skin diseases was reported from the Indian Council Scientific Research Laboratory.

The Premier of Australia, Mr. Playford, disclosed that uranium had been discovered in the Adelaide hills,

Plans for the construction of a \$500,000



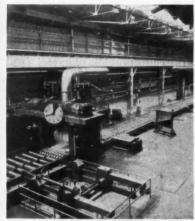
The Cabot carbon plant at Stanlow, Ellesmere Port, Cheshire, which was opened by the President of the Board of Trade in August. The factory was the first to be constructed under the Marshall aid investment guarantee

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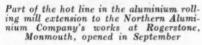
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Photograph by court sy of The Northern Aluminium Co., Ltd.





The I.C.I. Ltd. stand at the International Fair, Chicago. The display gave a highly individual representation of a wide sector of British chemical production

plant at Kingston, Ontario, to make the base material for nylon, were announced by Canadian Industries, Ltd.

Full details of a new original flow valve, suitable for use in all kinds of industrial processes, were given by the designers, Tiltman Langley Laboratories, Ltd. Glycerin reached the record price of £165 6s. a tou, the highest since 1920.

An exhibition of analytical equipment

was held at the Science Museum, London. A new caustic soda plant was opened near Bogota, Colombia.

Personal: Dr. F. Sherwood Taylor was appointed director of the Science Museum,

Obituary: Dr. Otto A. Beeck, Mr. E. T. Neathercoat, Capt. A. D. R. Aldred, Dr. Stevan Ruzicka.

#### SEPTEMBER

Nearly 2000 scientists assembled in Birmingham under the presidency of Sir Harold Hartley for the 112th annual meeting of the British Association for the Science, Modern Advancement of developments in carbohydrate chemistry were the subject of the presidential address by Professor E. L. Hirst to the chemistry section. The discovery of two new atomic particles, called V-particles, was announced by Professor P. M. S.

Blackett, and Sir Ewart Smith, a director of I.C.I., Ltd., emphasised that the neglect to make applied science and technology widely available to industry had greatly retarded industrial progress in this country.

American chemical exports in the first quarter of 1950 declined 20 per cent, compared with the same period in 1949.

The development of a new glass-fibre tube and pipe material, designed as a replacement for steel and other critical war metals, was reported by the United States Plywood Corporation.

Details of a new small chlorine plant were given by the manufacturers, Amroc, Inc., of New York.

Plans were reported to make Downe House, Orpington, Kent, into a residential centre so that, by means of short courses, persons without technical qualifications would be able to study the scientific method.

The Distillers Co., Ltd., announced that a £10 million loan had been granted by the Treasury to finance expansion of the company's potable spirits undertakings. Later, at the 78rd annual general meeting it was stated that the cost of taxation to the company had been a little under £12 million in the last two years. A new subsidiary company had been formed for the manufacture of polystyrene.

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An attempt to produce a standard measure accurate to one part in 40 million was reported from the U.S. Bureau of Standards.

First commercial production of glacial acrylic acid was announced by the B. F. Goodrich Chemical Company, Cleveland,

Names of the members of the Iron and Steel Corporation of Great Britain were announced by the Minister of Supply. The corporation consisted of a chairman, Mr. S. J. Hardie, of the British Oxygen Co., deputy chairman, three full-time and two part-time members.

Details of the new product of the Harwell atomic pile, Ir<sup>100</sup>, were presented to medical workers at the Scottish Hospitals and Public Health Exhibition. It was anticipated that Ir<sup>100</sup> would replace radium in the treatment of some skin diseases.

The 23rd Congress of Industrial Chemistry was held at Milan.

A new subsidiary of Glaxo Laboratories, Ltd., was formed in Canada with the object of promoting there a considerably larger scale of sales.

The Gas Council set up a research committee, including two prominent chemists, Sir Cyril Hinshelwood and Sir Robert Robinson, O.M.

A new pulsating pressure plant was shown to the technical Press during a visit to the Abington Centre of the British Welding Research Association.

The new premises of the British Hat and Allied Feltmakers' Research Association were officially opened by Lord Derby.

Announcing its intention of expanding operations at Texas City, the U.S. Mon-

santo Chemical Company stated that the principal objective there would be to increase production of acrylonitrile.

crease production of acrylonitrile.

The Manchester section of the Oil and Colour Chemists' Association celebrated its silver jubilee on 20 October.

The construction of a new oil refinery, in Ontario, to cost \$18 million, was announced by Mr. H. Rea, president of Canadian Oil Companies, who forecast that processing would begin in April, 1952.

The discovery of tritium in heavy

The discovery of tritium in heavy water was reported by the research institute of Temple University, Philadelphia, U.S.A.

Discussing advances in wool chemistry, at the summer conference of the Society of Dyers and Colourists at Leeds University, Professor Speakman said that variations in dyeing were now attributed to variations in the chemical constitution of the wool fibre.

Steel production in September reached the best annual rate ever recorded for that month, exceeding the 1949 September rate by over 1 million tons. Chemical exports for September were

Chemical exports for September were over £10 million, about £1 million more that the record July and August figures. Personal: The DUKE OF EDINBURGH Was elected president of the British Associa-

Personal: The DUKE OF EDINBURGH was elected president of the British Association for the Advancement of Science for 1951. DR. KENNETH C. D. HICKMAN was awarded a John Price Wetherill Medal by the Franklin Institute of Pennsylvania. PROFESSOR NIELS BOHR attended the international conference on atomic energy. MR. MARK H. HEYWOOD joined the board of P. B. Cow & Co., Ltd., as technical director.

Obituary: Mr. J. Black, Mr. F. H. Johnson, Miss W. E. Fenn.



Sir Cyril Hinshelwood, Gas Council Research Committee



Professor E. L. Hirst, president, chemistry section, BMA



Sir Harold Hartley, president of the BMA, 1950

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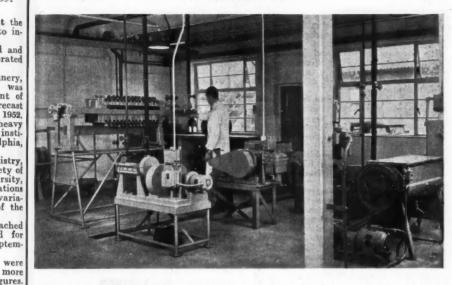
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Part of the well equipped semi-technical laboratory at Yalding, where the extended facilities were inaugurated by Sir Wallace Akers, in October. Above can be seen the filter press, drum dryer and homogeniser for emulsions, while at the extreme right is shown the powder mixer. All sections of the centre are represented in miniature in this laboratory.

#### **OCTOBER**

THE vesting date of the 92 steel companies scheduled to become the property of the State, was fixed for February 15, 1951.

New GPO laboratories were opened at Birmingham,

Promising reports were received from the U.S. of an unconventional contact sulphuric acid process being operated on a large scale by the American Cyanamid Co. at their Hamilton plant.

Atomic research and production centres to be built in a network over the north of England were estimated to employ about 25,000.

Methods for the estimation of small amounts of fluorine were described at a meeting of the Microchemistry Group of the Society of Public Analysts at Birmingham University.

Three new techniques for estimating fertiliser values, each said to offer considerable advances over existing methods,

were described at a meeting of the Society of Public Analysts in London.

Full details of vast French chemical expansion plans were given in the report of the Commission de Modernisation des Industries Chimiques, published at the beginning of the month. It was estimated that the capital expenditure involved would be at least Fr. 175,000 million.

A conference on the "Biological Hazards of Atomic Energy," organised by the Institute of Biology and the Atomic Scientists' Association, was held in London.

The disappearance of Professor Bruno Pontecorvo, a research scientist at Harwell atomic research station was the subject of questions in the House of Commons.

A new balance, designed to determine the specific gravity of liquids with an accuracy to the fourth decimal place, has been produced by the Central Scientific Co., Chicago, U.S.A., it was announced.

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Plans for the manufacture of synthetic detergents in Cuba were put forward by the Procter and Gamble soap organisation.

The shortage of industrial minerals in Canada led to the establishment of an Industrial Minerals Division in the Mines Branch of the Department of Mines and Technical Surveys.

The fact that Britain was now exporting chemicals to the U.S.A. in appreciable amounts was emphasised by Sir Harry Jephcott at the annual dinner of the Association of British Chemical Manufacturers

Deposits of potassium chloride, sufficient to supply the United Kingdom for 140 years, were found at Eskdale, York-

The eventual need for international or world control of zinc was foreseen by Mr. R. L. Wilcox, chief of the non-ferrous metals branch of the Economic Co-operation Administration.

A new source of uranium was discovered at North Shore Lake, Canada.

The recently expanded laboratories of Plant Protection, Ltd., were officially inaugurated by Sir Wallace Akers, of LCI

Disagreement with the proposal to found a separate university of technology was expressed by Lord Eustace Percy in a lecture on "Technical Universities" at the Institute of Physics in London.

Chemical imports showed an increase of £1 million over the corresponding period of 1949.

The total value of chemical exports in October surpassed the September record and also the October, 1949 total, thus setting a new high level.

Erection of a new experimental plant in South Wales to utilise waste acid liquor, was announced by the British Iron and Steel Research Association.



Mr. L. P.
O'Brien,
elected
ABCM president for a
second year

Four new pH standards were announced by the U.S. Bureau of Standards.

Greater use of power and mechanical equipment in the U.S. factories than in the British counterparts was emphasised in a report published by the Anglo-American Council on Productivity,

Personal: Mr. C. G. Hayman was appointed chairman of the Association of British Chemical Manufacturers. Mr. A. R. McBain was appointed a part-time member of the Iron and Steel Corporation of Great Britain. Sir Herbert Merrett became chairman of Powell Duffryn, Ltd. Professor C. E. Tilley was elected president of the Mineralogical Society. Mr. W. M. Cooper became assistant director of the general engineering department of the Monsanto Chemical Co., U.S.A. Professor R. J. Sariant was awarded the Melchett Medal for 1950. Dr. Irving Langmuir was awarded the John J. Carty gold medal and award of the U.S. National Academy of Sciences.

Obituary: Dr. S. Sugden, Mr. R. Graham, Professor R. Stanfield, Professor W. R. Atkin, Mr. F. H. Less, Mr. T. Harns.

#### NOVEMBER

THE GOVERNMENT'S intention to import from the Continent the necessary quantity of superphosphate fertilisers to make good the deficiency in home production was announced by the secretary for overseas trade, Mr. G. Bottomley.

Professor Pontecorvo's whereabouts was again the subject of a number of Parlia-

mentary questions,
A serious deficiency in chemical engineers in the next three years was estimated by the Ministry of Labour's Technical Personnel Committee. Although twice as many would be trained in English universities by 1954 there would still be a deficiency of about 15 per cent in the number of trained chemical engineers required for industry.

The merits of the flame spectrometer were discussed by the Society of Public Analysts at a meeting in Poole.

Restrictions in the civilian consumption in the U.S.A. of copper, nickel and aluminium were announced by the U.S. National Production Authority.

Production of two new antibiotics, Thiolutin and Netropsin, was announced at a meeting of the American Institute of Chemical Engineers in New York.

Increases in road haulage rates were discussed at a meeting of the Road Haulage Executive and chemical manufacturers in Widnes.

The use of cellulose nitrate in paint used

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in railway coaches was considered by the Parliamentary Secretary of the Ministry of Transport not to be the cause of the train fire at Beattock on 8 June.

An explosion occurred in one of the mixing houses for mining explosives of Explosives and Chemical Products, Ltd., at Bramble Island, near Harwich. Three men were killed and 25 other workers injured.

Dismissal notices were given to more than half the scientific staff when the Powell Duffryn research laboratories in Battersea Park Road were abruptly closed down.

Sir Herbert Merrett, newly elected chairman of the company, said that the board felt that the time had come for the research and development work to be transferred from the Battersea laboratories and consolidated at Hayes.

From the U.S. it was reported that the first nuclear reactor not owned and operated by the Atomic Energy Commission would be built at the North Carolina State College at Raleigh, to provide facilities for nuclear engineering research and education.

Three new British Standards concerning microchemical analysis were issued—the first of a comprehensive series to be published on microchemical apparatus and methods.

Analysis of the alkali metals was the principal topic at the first meeting of the newly formed Midlands Analytical Methods Discussion Group.

News from South China indicated that most of China's output of wolfram was being delivered to Russia; 12,000 tons were sent during August.

#### Nobel Prize Winner

The Nobel Chemistry Prize for 1950 was jointly awarded to Emeritus Professor Otto Diels of Kiel University and his former assistant Professor Kurt Alder, director of the Chemical Institute at Cologne University. The award was made for the discovery and development of the dien synthesis.

Plans for the erection at Wilton, Yorkshire, of a new plant for the production of Terylene, were announced by I.C.I., Ltd. It was predicted that the annual output of the new plant would be about 11 million lb.

Chemistry's importance to the general needs of the modern community again found ample illustration in the Public Works and Municipal Services Congress, held at Olympia. Pumps, insecticides, water filters, rubber powder, and a multitude of other items helped to demonstrate the varied range of local government activity and its dependence on the chemical engineer.



Mr. C. G. Hayman, new ABCM chairman

A tenfold expansion of its research programme in ten years was made known by the chairman of Glaxo Laboratories, Ltd., Sir Harry Jephcott, in a review of the year ending 30 June.

#### Zinc Stocks Reach Danger Level

Despite the fact that domestic production of zinc was the highest since 1944 the stocks of zinc in the U.S.A. fell to their lowest level for 25 years.

Tin reached its highest price ever—£1,300° per ton, but later fell to £1,000 per ton.

Because of the uncertainty of future supplies of isopropanol from the U.S., British Industrial Solvents, Ltd., introduced a temporary rationing system. This was to avoid the danger of any acute shortage pending the start of production at the new isopropanol plant at Grangemouth.

Announcing that the U.K. coal output was insufficient to meet the growing requirements of industry and the small export trade, the Minister of Fuel, Mr. Noel Baker, said that it would be necessary to buy abroad the equivalent of "part of one week's output." In a paper dealing with smoke prevention, read before the Royal Society of Arts in London, Dr. Albert Parker, director of the Fuel Research Station, DSIR, said that the misuse of coal was probably costing the country at least £50 million every year.

It was estimated that about \$3 million would be spent by Marathon Paper Mills of Canada, Ltd., in expanding its plant at Marathon, Ontario. A new chemical plant was scheduled, which would produce about 25 tons of chlorine every day.

The King approved the award of two Royal Medals of the Royal Society for the current year to Sir Edward Appleton, for his work on electromagnetic waves, and to Dr. C. F. A. Pantin, for his contributions

to the comparative physiology of inverti-

The chemical industry suffered a heavy loss in the death of Sir Frederick Bain, M.C., deputy director of I.C.I., Ltd. A great leader, his death brought many tributes from those who knew him well, and liked and respected him as one of the outstanding personalities of British industry.

Personal: SIR JOHN COCKROFT was awarded an honorary degree at the London University Foundation Day celebrations. SIR LEWIS FERMOR was elected president of the Institute of Mining & Metallurgy for the 1951-52 session. PRINCESS ELIZABETH, as president of the Royal Society, awarded the Albert Medal to SIR EDWARD APPLETON for his achievements in pure and applied science. For the fourth year in succession, COLONEL H. C. SMITH, deputy chairman of the Gas Council, was re-elected as president of the British Road Tar Association. MR. S. J. L. HARDIE resigned from his post as chairman and director of British Oxygen Co., Ltd., so as to be able to carry out his duties as newly-elected chairman of the Iron and Steel Corporation of Great Britain. Dr. Bernard Raistrick was appointed research manager of the new central research department for fertilisers being set up by Scottish Agricultural Industries Ltd., in the Edinburgh area.

Obituary: Mr. Charles Gandy, Mr. E. E. Billington, Mr. J. C. Garland, Dr. G. A. Hankins.

#### **DECEMBER**

A RATIONING scheme for zinc, to take effect on 1 February, was announced by the Minister of Supply, Mr. G. R. Strauss. From the same date the use of zinc and copper in the manufacture of certain "non-essential" consumer goods was to be prohibited.

Proposals to try and overcome shortage of raw materials, particularly non-ferrous metals, sulphur, rubber and iron, were considered by the OEEC council, at a meeting in Paris.

First full details of the Harwell Graphite Low Energy Experimental Pile (GLEEP) were released, by mutual agreement between Britain, Canada and the U.S.A.

A new long term agreement between the Ministry of Supply and the Aluminium Company of Canada, Ltd., was announced. Arrangements were made for the supply to the U.K. of an additional 50,000 metric tons of aluminium, in addition to the 150,000 metric tons already contracted for in 1951.

Plans for the erection of an uranium ore refinery were disclosed in the U.S.A.

More than 200 nuclear scientists attended the International Conference on Atomic Particles held at Bombay.

A record output in 1950 of Canadian nickel was reported by Dr. John F. Thompson, president of the International Nickel Company of Canada, in a review of the nickel industry on 14 December.

Details of progress made at Wilton, where the giant £22 million chemical installation is being erected by I.C.I., Ltd., were made available during the month. The first two plants to come into operation were those of the plastics division for the manufacture of phenolformaldehyde and Perspex acrylic resin.

#### Shortage of Drums

Attention was drawn in a leading article of The Chemical Age to the increasingly serious shortage of steel drums for industry.

The necessity for chemists to remain true to their jobs without political or material bias was emphasised at the annual dinner of the British Association of Chemists. Dr. Herbert Levinstein, president of the association, said that there were at present fewer trained chemists in proportion to those who were half-trained. The chemist must remain true to his profession and unprejudiced by outside influences.

Interest in sulphur supplies became intense, following news from the U.S.A. that 1951 allocations would be considerably reduced. The U.S. Department of Commerce finally announced that Great Britain was to receive 81,465 tons of crude sulphur in the first quarter of 1951; about 70 per cent of the total actually required. As a result the Board of Trade inaugurated as system of rationing for sulphuric acid and crude and processed sulphur.

The Electrical Power Exhibition was opened at Glasgow's Engineering Centre on 21 December.

Notification that the imports of virgin copper were to be reduced in 1951 was given by the Ministry of Supply. Supplies were to be restricted to 50 per cent of 1950 consumption; consumers of imported electrolytic copper in special shapes would receive up to two-thirds of their 1950 consumption.

Following six months of fantastic records and dizzy fluctuations, the price of tin reached its highest level ever—£1802 los. a ton.

A considerable number of additions and alterations were made to the list of chemicals liable to Key Industry Duty. Organic An

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An exterior view of the PF resin and powder plant on the 2000-acre site at Wilton

substances were mainly affected, including halogen substituted compounds, pthallic acid esters and some aldehydes and ketones.

A reminder that the first laboratory for the teaching of chemistry was established at the Royal Technical College, Glasgow, was given by Dr. Idris Jones, chief of the scientific department of the National Coal Board, speaking at the annual dinnerdance of the London branch of the R.T.C. Former Students' Association.

A team of representatives of the French nitrogen fertiliser industry began a sixweek study of American methods of production,

Advantages of the spectro-photometric



An interior view of the Perspex sheet plant at I.C.I.'s Wilton works



John Rogers



Lord McGowan

method of measuring colour as compared with other procedures were emphasised by Mr. E. Waters in an address to the London section of the Oil and Colour Chemists' Association. Use of the spectrophotometer was to be preferred to other systems, he said, because it was an objective form of measurement, independent of the operator and relying only on subsequent physical measurements and calculations.

That a large part of research in the United States was being conducted in the wrong direction was stressed by Professor E. R. Gilliland at the annual meeting of the American Institute of Chemical Engineers. A high percentage of Governmentfinanced research, particularly that carried out on behalf of the military services and by the Atomic Energy Commission, he maintained, was in fact, a potential hazard to the country. professor urged that scientists should take the initiative and consider the implications of the work they were doing.

Some information on low power nuclear research reactors was released by the

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atomic energy authorities in Canada, Great Britain and the U.S.A.

Names of the scientific societies which had agreed to participate in the proposed new Science Centre in London were revealed by Sir Robert Robinson in his address as retiring president at the anniversary meeting of the Royal Society. Among the organisations co-operating in the new venture would be the British Association, the Royal Society, the Chemical Society and the Society of Chemical Industry.

Quadruple expansion of the U.S. magnesium industry was predicted by Dr. J. D. Hanawalt, general manager of the magnesium division of the Dow Chemical Co., at the annual meeting of the Mag-nesium Association in New York.

The retirement of LORD Personal:

McGowan from active office as chairman of I.C.I., Ltd., was announced for reasons of health. He had been actively associated with the company and its forerunners for over 60 years. He was succeeded on January, 1951, by Mr. John Rogers. The Harrison Memorial Prize for 1950 was awarded to Dr. H. C. Longuer-Higgins. The prize is given to the British chemist under 30 years of age who, during the previous five years, has published the most meritorious and promising investigations in chemistry. Professor E. D. Adrian was elected as president of the Royal Society in succession to Sir Robert Robinson—who had held the office for five

Obituary: Mr. F. W. Richardson, Mr. H. N. Robson, Professor J. F. Spencer, Mr. Frederick Peel.

## A New Polarograph Design

NEW Cambridge direct - writing A polarograph, which was first shown as a prototype model at the Physical Society Exhibition, is now in production and has been proved in daily use under industrial laboratory conditions.

It performs the same functions as the standard Cambridge photographic type polarograph, and consists of a robust direct-writing galvanometer with amplifier, potentiometer, and chart driving mechanism.

The instrument has a high stability linear amplifier, of negligible input resistance, which operates a pointer galvanometer carrying the recording pen. Amplification is variable in steps between 0.4 mm. per microamp. and 400 mm. per microamp.

The potentiometer is graduated from +0.4 volt to -1.4 volts at 5 millivolt intervals and the range can be doubled or halved. When high precision measurements are required, adjustment of current through the potentiometer is made against a standard cell contained in the instru-

Damping is effected by a novel system whereby the shape of the curves for average current is virtually unimpaired, and allows much more certain recording of substances the reduction potentials of which lie close together. The degree of damping is adjustable in six steps and is accurately reproducible.

The paper chart dimensions are 75 mm. on the current axis and 160 mm, on the voltage axis, and it is ruled to form 1 mm. squares: ordinary squared paper may be used. The plate to which the chart is attached has cylindrical curvature equivalent to the arc of motion of the pen, and this ensures uniformity of current readings, the linear displacement on the chart being proportional to the angular move-ment of the galvanometer. The applied potential can be read through a window as the record is being made.

The chart position and potentiometer are adjustable independently, coupling between the latter and chart drive being effected by a clutch, enabling recording to be started at any point of potential or taken at constant potential when decoupled.

The instrument is simple to operate and records are immediately available for analysis. The definition of the records is better than those obtained on the photographic instrument.



The New Cambridge Polarograph

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## INDUSTRIAL LAW DURING 1950

THE development of industrial law, as it affects the chemical industry, has not been so rapid as in other years since the war. Two Acts of Parliament, the Distribution of Industry Act and the Shops Act are of particular importance. The number of Regulations has been somewhat reduced, since the "bonfire of controls," but there are still some which are of weight. 1950 S.I. No. 1769 provided that the Supplies and Services Act should remain in force during 1951. New Patent Rules have been issued, which will require careful study by inventors and patentees. The Courts have given several important decisions on the scope of the Factories Acts and the extent of the employer's duty to provide for his workmen's safety.

The Distribution of Industry Act supplements the statute of a similar name passed in 1945. The purpose of the 1945 Act was to assist the growth of industry in the development areas and there were certain general provisions as to the siting of new plants. The new Act provides the Board of Trade with considerably greater powers. Previously the power to acquire land was to be used for the purpose of constructing new buildings or adapting old ones. Now the Board may purchase industrial property to be used as it stands. It may also acquire easements necessary for the use of that property.

The Board is no longer limited to work on its own land. It may carry out work on land in private ownership "for the purpose of facilitating the carrying on of an industrial undertaking in a development area."

The conditions governing grants are also relaxed. It may now make grants in exceptional circumstances to a person establishing an undertaking in, or transferring it to, a development area. Grants or loans may also be made to housing associations for dwellings for persons to be employed in the area. Payments may be made to personnel involved in a transfer of a business to a development area. They will qualify for payments for the cost of removal and resettlement, as if they were within the scope of the Employment and Training Act, 1948.

#### 1950 Shops Act-

The 1950 Shops Act consolidates the law contained in the various Shops Acts 1912-38. Part I deals with the hours of closing and provides for an early closing day once a week. It also limits the hours at which shops may close. In the winter months, that is from the first Sunday in November until the first Sunday in March,

they must shut not later than 6 p.m. One late day per week is permitted, on which they may remain open until 7.30 p.m. In the other months they may stay open until 7 p.m., and 8 p.m. on the late day. Local authorities may extend the winter hours until 7 p.m., and 8 p.m. on two days. Before taking such action the local authority must consult the representative associations concerned.

Intervals must be allowed for meals. No one must work more than six hours at a stretch without a break of at least 20 minutes. A dinner period of one hour (or three-quarters of an hour if the meal is taken in the shop) is to be given between 11.30 a.m. and 2.30 p.m. Half an hour must be provided for tea between 4 p.m. and 7 p.m.

#### Provisions for Juveniles

There are special provisions as to hours of employment and meal times for young persons under 18. There are also rules as to Sunday trading.

Welfare is dealt with by a section which requires seating for women, in the ratio of one to every three employees. Ventilation, temperature, sanitary conveniences, washing facilities and lighting must be suitable and sufficient. Where meals are taken in the shop, facilities must be provided.

The Control of Engagement Orders have been revoked (1950 S.I. No. 329). By 1950 S.I. No. 338 the control of dyeing and cleaning businesses was repealed. Paint was also freed from control by 1950 S.I. No. 24. This had previously applied to the acquisition of material for incorporation in paint, lacquer, varnish and distemper, the treatment, use and consumption of material acquired for that purpose and the disposal of material so acquired.

There have been several orders dealing with fertilisers which are still subject to price control. The Orders cover sulphate of ammonia, basic slag, compound fertilisers, raw phosphate and ground phosphate rock, muriate of potash, sulphate of potash and ordinary superphosphate of lime, 1950 S.I. No. 719 provided for increased maximum prices to cover increased delivery costs for all fertilisers in Great Britain, other than muriate and sulphate of potash, but including compound fertilisers. The increase was also given in Northern Ireland except for muriate and sulphate of potash, ground phosphate and compound fertilisers. 1950 S.I. No. 919 made further increases. Maximum prices were also laid down in this Order for triple superphosphate of lime and nitrochalk. 1950 S.I. No. 1039 imposed a charge

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corresponding to the price increases granted by the last Order on all subsidized fertilisers in the hands of fertiliser manufacturers, when the price increase took effect. It also provided that the Sulphate of Ammonia (Charges) Orders 1940-1946 were not to apply to deliveries of sulphate of ammonia made after 30 June 1950.

The maximum price of sulphuric acid was increased twice during 1950 by S.I. Nos. 447 and 1784. It has been announced that sulphur and sulphuric acid will be rationed, by a Statutory Instrument which had not been published at the time of

writing.

The new Patent Rules 1949 S.I. No. 2385 came into operation on 2 January 1950. They replace the Patent Rules 1939-1946 and prescribe the procedure to be followed in making applications for patents under the Patents Act 1949. They also prescribe the fees to be paid and forms to be used in respect of proceedings and other matters relating to patents under the 1949 Act. The 1949 Act was a consolidating measure, but as it embodied a considerable number of changes made by the amending Act of 1948 and the rules had not been amended since 1946, there is a good deal of new material in these Rules.

#### Form Laid Down

The form of application is laid down. If the application is not made by the inventor, it must be accompanied by a statement by the inventor that he assents to the making of the application. Drawings are to accompany the provisional or complete specification to which they refer. The way in which drawings must be prepared is laid down in detail.

The Examiner is to conduct the search for anticipation by previous publication, or by prior claim. If the Examiner finds anticipation, the applicant is to be given an opportunity of amending his specification. Rules lay down the procedure on amendment. Provision is made for reference being made to mother patent, where it appears to the Examiner that the applicant's invention cannot be performed without substantial risk of infringement of a claim of another patent.

A notice of opposition may be but in. This must state the grounds on which the opponent intends to oppose and a statement setting out the nature of the opponent's interest, the facts upon which he relies and the relief which he seeks.

The procedure on sealing a patent after the termination of proceedings is set out. So is the scale of renewal fees. There are rules as to the procedure for extending the term of a patent on ground of war loss by the patentee, and also for the restoration of lapsed patents and lapsed applications for patents. The procedure to be followed by a person applying for the revocation of a patent is prescribed.

Further rules deal with the procedure to be followed upon application for voluntary and compulsory endorsement of a patent "licences as of right" and for

compulsory licences.

Disputes as to infringement may be referred to the Comptroller. Disputes as to rights in an invention made by an employee may be settled in accordance with the Rules.

Evidence is to be taken by affidavit. Power is given to direct that hearing shall take place in Scotland.

The most important decision in industrial law during the past year has been given in the House of Lords in the case of Paris v. Stepney Borough Council. The full report of the judgment is not yet available, but the case appears to establish an important new principle. It has always been the duty of the employer to provide a safe system of work. In this case a one-eved man was struck in his good eve by a chip of metal and completely blinded. The decision was that while it would not have been reasonable to expect the employer to provide goggles for a two-eyed man, because the risk of injury was slight, it was his duty to provide them for a one-eyed man, because the effect of injury would be so much more terrible. Employers will have to consider their duty to injured men very carefully in the light of this decision.

In Beardsley v. United Steel Co. (reported in 1950, 2 All England Reports p. 872) the duty imposed by the Factories Act that all lifting tackle should be of "good construction, sound material, adequate strength and free from patent defect" was considered. The employers provided for such tackle for a particular job, but a workman used other unsuitable tackle, with the result that one of his mates was killed. It was held that the employers were not liable.

#### **Duty To Maintain Passages**

The duty to maintain passages in an efficient state was considered in Davies v. De Havilland Aircraft Co. (Ibid p. 582). It was held that there was no breach of this duty where there was a slight depression in the floor in which rain water might collect so that the floor became slippery. The duty to provide safe means of access to every place at which any person has at any time to work was not broken by a patch of greasy substance being left in the passage to the canteen, because that was not a place of work.

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## FERTILISERS IN 1950

by D. P. HOPKINS, B.Sc., F.R.I.C.

N the FAO Commodity Report on Fertilisers dated 10 August 1950, it was said that the present "is an important period of transition in the world production and consumption of commercial fertilisers. For the first time since the war, world supplies of most fertiliser materials are now sufficient to meet effective world demand. . . . While, however, shortage of supply is no longer a major factor in limiting the expansion of fertiliser consumption, other factors are exerting an adverse influence in some countries." There can be no doubt that the phrase "other factors" virtually covers what might be called the economic factor. Certainly for the British fertiliser industry this factor has dominated the trading year of 1950 and to a greater extent than some members of the industry may have expected. known before the year began that the first stage of a two-stage plan to remove subsidies would be introduced. Those who looked upon this with pessimism have so far been proved to be realistic prophets.

On 1 July 1950, as a result of this first stage of subsidy removal, the prices of most fertilisers rose by about a third and the prices of a few fertilisers by considerably larger proportions. For ten years of war and post-war farming expansion, fertiliser prices had been controlled to their pre-war levels, such upward movements as took place occasionally in the maximum price orders being minute. Rising costs of production and of import purchase had been steadily added to the subsidies. In May and June, which are normally months of low demand, the industry experienced an unprecedented "boom," farmers and merchants buying for store before the anticipated price rises. Nothing contributes to the profitability of fertiliser manufac-ture more than "out of season" business activity; consequently, those com-panies whose financial years ended on 30 June have shown record sales and abnormally high profits. Nothing could be more misleading than the assumption, already unhappily made in some quarters, that this shows that the industry is enjoying exceptionally prosperous conditions and opportunities.

#### A Much Darker Period

Since 1 July, the industry has passed through a much darker period. With agricultural storage space well filled with the pre-July purchases and with one of the wettest harvest and autumn seasons

known for many years, demand has been abnormally low. It is certain that the profitability of the May-June boom has now been offset by the July-December drop in sales. Unhappily, the industry also had to face a further complication in the sulphur and sulphuric acid shortage that arrived with some abruptness in the early autumn. The almost complete cessation of our sulphur imports from the United States was immediately felt, for the official view was taken that the superphosphate industry, as the largest single user of acid, could shoulder the whole, or almost the whole, of the first effects. British superphosphate production was reduced drastically; and much of the normal trade for superphosphate-direct application and compound mixing-is now based upon imported Continental superphosphate.

#### Too Early to Comment

As yet it is too early to comment upon the full effects of this emergency policy, but they are obviously adverse rather than beneficial. Previous production costs on the usual "per-ton" basis have been favourably influenced by the substantial tonnage figure by which many of the otherwise heavy and rising charges could be divided; for example, rising wage rates have been partially offset in their proportionate effects upon costs by rising output. With such severe reductions in the supply of a vital raw material, productivity effects upon costs per ton are lost.

So far no shortage of fertilisers has been felt by farmers, the change in the raw material position being temporarily bal-anced by the abnormal lowness of demand; in any case, imports of superphosphate have been adequately secured. Nevertheless, it is not impossible for there to be a scarcity situation in the spring of 1951; any delays in the arrivals of imports could rapidly transform the market situation. For the de-subsidised prices are resented by many farmers and this has intensified their tendency to insist upon delivery at short notice as and when they want to use fertilisers, a buying policy that can avoid distribution chaos only if raw materials are all plentiful, if the industry itself possesses storage space for more than half of its anual output, and if there is a reservoir of unemployment from which seasonal labour forces can be obtained. Should an accentuated return to seasonal demand

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and deliveries be one result of de-subsidisation, it will prove costly to both farmers and fertiliser manufacturers.

Another useful report of 1950 was that of the Commonwealth Economic Committee (A Survey of the Trade in Fertilisers). Graphically presented statistics for this country, Denmark, Canada, and the United States, in each case for the period 1925-50, show that fertiliser consumption Denmark, Canada, is directly related to farm produce prices (or farm income) and not to fertiliser prices. The graphs for consumption are broadly parallel with those for farm produce prices; those for fertiliser prices are isolated. This might suggest that the rises in price here through desubsidisation will not lead to a fall in fertiliser use, but it should be noted that sharp changes in fertiliser prices did not occur in the period of 1925-50. This evidence from the recent past cannot, therefore, be a complete guide to the immediate future. Moreover, the controlled or guaranteed prices for farm produce are not rising as steadily as farmers' production costs; such, at any rate, is the view of many farmers.

#### Selective Subsidy Introduced

At the same time that subsidies were partially removed from all mineral fertilisers, a new and selective subsidy was introduced, directly payable to farmers in respect of fertilisers used for grassland. This concession is in line with the views of the Committee on Industrial Productivity, whose first Report in 1949 observed: 'To-day, less than a quarter of the 18 million acres of grassland in the U.K. receives dressings of nitrogenous fertili-. . in spite of the fact that experimental work has shown that the response to a given quantity of nitrogen is greater in the case of grass than for either cereals or root crops." The new subsidy scheme provides proportional payments towards farmers' actual fertiliser costs up to certain maxima per acre and for maximum proportions of the farm's total acreage. There has been some criticism that this scheme and its necessary form of application are too complicated, but this seems petty and superficial; no one can expect a subsidy payment without administrative documents, and the general principles of the scheme are in fact well conceived. Unhappily its birth has been attended by extremely bad weather and it still remains to be seen whether farmers take full advantage of its offerings. The payments are wisely made for phosphatic and potassic fertilisers as well as for nitrogen.

These are all large changes in the economic climate of the industry and most of their effects did not begin to be felt

until the second half of 1950. Yet no time is to be allowed for adjustment and consolidation. Before realistic consequences can be assessed, the second and final stage of de-subsidisation is scheduled for 1 July 1951, when it is anticipated that similar additions will have to be made to prices.

It is at least refreshing to turn from economics to the technical picture. The most notable event of the year was beyond doubt the report by Dr. A. Fleck, of Imperial Chemical Industries, of progress so far made towards the establishment of a British potash-mining industry in Yorkshire. The strata of potash salts found shortly before the war during oil prospecting have now been amply confirmed by further bore-holes sunk in 1948-50; though the potash-bearing brines observed at the foot of the older borehole have not been found in these new investi-gations. Although the Yorkshire deposits are deeper placed than the deepest potash mines now being worked anywhere in the world, the lower of the two beds has a thickness "only rarely exceeded in any known potash field." In an area of some 12 sq. miles, it is estimated that there are 200 million tons of muriate of potash in the form of sylvinite, the easiest of the common potash ores from which commercial muriate may be obtained. If 35 per cent of this reserve can be extracted, this amount would meet all U.K. requirements for 140 years even when a higher annual rate of use than any past rate is assumed. Nor is there any evidence that this area so far prospected limits the Yorkshire deposits. No judgment can yet be made as to the technical and economic prospects of mining these newly-formed resources; the great depth of the beds-some 4,000 ft. below the surface—must present a number of serious problems. However, if Dr. Fleck was non-commital on this aspect of the deposits, the atmosphere of his paper was confident rather than dubious. other large fertiliser company, Fisons, is also interested in this development; a test bore sunk at Robin Hood's Bay has revealed a 7-foot thick seam of sylvinite which includes a 12-in, band of pure potassium chloride; the depth of this rich deposit has been stated to be 3,455 ft.

#### Most Pressing Problem

The most pressing problem of fertiliser technology is still that of producing an efficient phosphatic fertiliser from mineral rock phosphate. The superphosphate process, now almost 110 years old, has yet to be displaced. Indeed, evidence during 1950 has tended to strengthen the view that no other process can produce a fertiliser more efficient in its soil-action despite the high

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degree to which water-soluble phosphate may be fixed by other soil constituents. Nevertheless, the sulphur situation and its effect upon acid supplies brings this matter into a different perspective. Even if the sulphur shortage can eventually be overcome by increased production of acid from other sulphur-containing materials, these new sources of acid will inevitably mean dearer acid. The alternative processes of activating phosphate rock by high temperature fusion treatments have so far been regarded as more costly than the superphosphate process, a view whose general correctness was confirmed in a 1950 symposiume of American papers on phosphate rock treatment. Rising costs for superphosphate production are likely, however. to stimulate interest in fusion methods. It is not irrelevant that Dr. A. B. Stewart, in a 1950 paper read to the Fertiliser Society (not yet published) on the soil fixation of phosphate suggested that progress in fixation repression lay with soil management, rather than with the development of new types of phosphatic fertilisers.

## Important Role Stressed

The part played by fertilisers in expanding grassland's food production was com-prehensively surveyed by R. A. Hamilton early in 1950. The intimate connection between grassland management and fertiliser use was emphatically stressed. Unlike arable crops, grass production is continuous. The increased output obtainable by fertiliser application must be utilised for grazing, for silage making, or for conversion into dried grass meals, at the optimum times, and the balance of these different utilisations must be determined so that the annual requirements of cattle are secured. This valuable paper, based upon modern field and farm investigations, makes it clear that grassland fertilisation must be approached as an almost entirely new branch of fertiliser technology; advisory services, both within and outside the industry, must regard the campaign "to treat grass as a crop" as a long-term project. The intensive use of fertilisers to increase arable crop yields is a much less complex subject.

## NO MAJOR SULPHUR PLANS

O far as can be learned from official Sgas industry sources there is no intention of building large scale plants in Scot-land to assist in the current sulphur shortage. A pyrites burning plant of the most advanced Continental type is being installed at Aberdeen by Scottish Agricultural Industries, Ltd., but this is, so far as known, the only major project planned. Gas works are facing a large number of factors which limit the help they can give. Capital expenditure is being limited stringently and no additional capital—and a considerable amount would be necessary is likely to be available; slow deliveries of raw materials also make any speedy assistance in the present sulphur scarcity unlikely since the construction of additional special plant would probably take years to complete.

## Maximum Assistance

These factors do not mean that the industry is disinterested, however. Intention is to assist to the maximum, while maintaining the attitude that sulphur is a byproduct rather than a primary product. Intention, therefore, is to step up gas production to the maximum level, thereby increasing the volume of oxide available to processors. Policy in the past has been to sell to processors and allow them to handle the production and marketing of sulphuric products. This is likely to remain the policy. A considerable num-ber of large scale schemes of expansion and integration are being worked out now; many are in an advanced stage of completion and should add materially to production of oxide-and of gas-within the next year.

The effect of the rearmament programme may be such as to slow down this help. Officials of the Board indicate that delivery dates are slowing down and that the more favourable situation of early 1950 is rapidly deteriorating. In some cases plant and equipment are now as far as four to five years in arrears. Faced with such a situation the prospect of fast expansion of production is dependent largely on success (or luck) in achieving plant deliveries.

While priority status gives a slight advantage for a few weeks, experience has been that priority is meaningless after that time. Other industries and other users creep up to and bring the position back very much to where it was originally. Other sources of sulphur, mainly from coke oven production in the steel working industry, are shortly due to come within the scope of nationalisation.

<sup>&</sup>lt;sup>1</sup> "Survey of the Trade in Fertilisers," Comm. Econ. Comm. 34th Report, 1950. (H.M.S.O. 3s. 6d.)

A. Fleck. "Deposits of Potassium Salts in North East Yorkshire." Chemistry and Industry, 1950, Oct. 17th. also Chemical Age, Oct. 28th, 604-608.

<sup>3</sup> Feb. 1950 issue of Ind. and Eng. Chem.

<sup>&</sup>lt;sup>4</sup> R. A. Hamilton. "Role of Fertilisers in Increasing Output from Grassland," Proc. Fertiliser Society, No. 8., 1950, p.p. 52.

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## Fuller Use of Non-Ferrous Metals

## November Stocks Lower

DESPITE a general increase in output of non-ferrous metals in November, 1950, closing stocks were reduced owing to an all-round rise in consumption compared with the same month of 1949.

Comparisons revealed by the summary issued by the British Bureau of Non-Ferrous Metal Statistics showed closing stocks at the end of November (in long tons) were:—Blister copper 30,351 (50,570); refined copper 73,033 (86,036); slab zinc 37,308 (64,169); tin 7921 (15,765). Consumption of unwrought copper was: primary, 36,334 (9348); secondary, 15,834 (6149).

Exports of tin were lower for the first occasion for some time, with a total of 871 long tons, compared with 1168 long tons in October, 1950. This total was, nevertheless, greatly in excess of the figure of 483 long tons for November, 1949.

#### UNWROUGHT COPPER

				Long tons		
OPENING STOCKS: Govt. and consumers'				Blister Copper 39,271	Refine Copper 81,140	
Imports	***	***		2,500	17,830	
PRODUCTION:						
Primary	***		***	_	10,530	
Secondary			***	1,199*	7,774	
CONSUMPTION:						
Primary	***		***	10,632	36,334	
Secondary			***		15,834	
Exports	486	***	***	751†	17	
CLOSING STOCKS Govt. and cons		s'	***	30,351	73,033	

\* Rough copper.
† Includes 501 tons of rough copper despatched to
Belgium and 250 tons of rough copper to Germany for
refining on toll.

GROSS OUTPUT OF MAIN COPPER ALLOY, AND PRODUCTS

A AUGA	POULU				
Unalloyed copper products	***	***	30,569	long	tons
Alloyed copper products	***		30,443		99
Copper sulphate	***	***	5,282		11

#### UNWROUGHT ZINC

Long tons
Zinc in Concentrates Slab Zinc
(estimated gross (all grades)
Zinc content)

40.400	10.001
	40,981
0,100	13,418
4	5,240
7,081	20,793
_	9,076
_	5
48,548	37,308
	43,462 6,163 4 7,081

 Includes a small quantity of zinc concentrates consumed directly for chemicals, etc., which is also included as consumption of concentrates.

		LE	AD		
			Long	tons	
		Lead in Concen- trates	Imported	English	Lead Content of second- ary Scrap and Residues
OPENING STOCK	S:				
Govt. and	con-				
sumers'	***	-	63,829	8,215	Married,
Other stocks		77	-	-	-
IMPORTS	***		8,506	(Married)	175
PRODUCTION	***	329	-	6.708	
CONSUMPTION		337	15.257	6,695	9.562
EXPORTS AND	RE-			,	
EXPORTS	***	-	289	-	-
CLOSING STOCK	S:				
Govt. and	con-				
sumers'	***	-	56,874	8,228	.00000
Other stocks	244	69	_	_	

		TIN	METAI	4		L	ong Tons	
GOVT. AND	CONSUM	ERS'	STOCKS	(at	end	of		
period)	***	50.0	***	***	*		7,921	
IMPORTS	***		***	***			510	
PRODUCTION		***	***	***				
CONSUMPTIO		***	***	555	*		2 156	
EXPORTS AN	D RE- Ex	PORT		***		**	871*	

Exports total 790 tons, of which to U.S.A. 298;
 France, 99; Egypt 85; Germany, 60; S. America, 53;
 Denmark, 46; Canada, 40.

# ANTIMONY Long Tons

TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS ... ... ... 512
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP 435

## CADMIUM

Total Consumption of Cadmium ... Long Tons ... 43.30

#### Gas Output Record

Edinburgh District of the Scottish Gas Board increased their December, 1950, output to 729,000,000 cu. ft., or 76,000,000 cu. ft. and 10.4 per cent more gas than had been achieved in the previous best-ever-month — December, 1949. This fine month — December, 1949. This fine achievement, Mr. D. Beavis announced at a social gathering in Edinburgh, was achieved through the commissioning of additional gas making and purification plant during the preceding 18 months, the full value of which is now beginning to show. Maintenance of such records and expansion above these, as still more new plant comes into use in many areas in Scotland, is dependent on coal supplies. As gas production goes up, expansion of by-products follows. Most of the major gas works have put into operation development plans to achieve maximum expansion of such ancillary output and revenue and the need should be increasingly met as such plant comes into full operation.

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## PROGRESS DURING 1950 IN DRUGS AND MEDICINAL CHEMICALS

by G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Mech.E.

Is now not far short of two years since a small amount of synthetic Compound E, now known as cortisone, became available from the laboratories of the Merck organisation. This small quantity of material enabled Kendal and his co-workers to demonstrate that this steroid was dramatically powerful in reversing the course of rheumatoid arthritis, the pain and deformities of which are ordinarily relieved only by the death of the sufferer.

This demonstration was the first successful step in the elucidation of the functions of the four steroids, which had been named Compounds A, B, E and F, which were isolatable from the cortex of the adrenal gland. Compound A had been characterised earlier as 11-dehydrocorticosterone. It was found to have no influence on the course of Addison's Disease, though it afforded an element of protection to laboratory animals against certain poisons and exposure to cold. Compound B (corticosterone) is devoid of the activity of cortisone which is shared only with Compound F (17-hydroxy-corticosterone).

## Complicated Synthesis

The historical events which led to the synthesis of cortisone were dealt with at length in last year's review (this journal, 21 January 1950, p.123), where reference was also made to its chemical and physiological significance. Cortisone is a derivative of \$\delta\$-pregnene as also are Compounds A, B, and F. Prior to synthesis they were obtainable only from adrenal glands of slaughtered animals. The synthesis from steroids of ox-bile is complicated and tedious; but it has been prosecuted with such energy that the cost of cortisone has been reduced from \$250 to about \$30 to \$50 per gramme during the past 12 months. But, as pointed out last year, the product from 40 head of cattle is required to produce sufficient cortisone for a single daily dose for one patient and there are six million arthritics in the U.S.A. alone. There would not be enough ox-bile in the world to treat all sufferers. Consequently, intensive search is being made for alternative sources of raw material.

Available during the winter months of 1948-49 to the extent of a few milligrammes for clinical trials in rheumatoid arthritis and rheumatic fever, the hormone

is about to become available in U.S.A. in such quantities that it has been found desirable that a statement be made by Dr. J. M. Carlisle, Medical Director of Merck & Co., the chief manufacturer, with the approval of medical consultants (J. Amer. Med. Ass. 1950, 143 (9), 831), to the effect that: (a) production is increasing steadily and the supply of cortisone is now more than sufficient to cover the needs of clinical and other requirements (in U.S.A.); (b) Cortisone has been under investigation by 900 clinicians in U.S.A., as well as by a number of investigators in the fundamental sciences and a large body of information has been accumulated. Consequently, (c), intensive instruction courses in the use of cortisone are being instituted at various places in U.S.A.

## ACTH Being Made Available

Simultaneously, Dr. J. R. Mote, Medical Director of the Amour Laboratories, Inc., Chicago, in consultation with a panel of physicians, has announced that adreno corticotropic hormone (ACTH) is: (a), being made available to all medical schools where trained supervision in its use is available and these facilities will be extended as production permits; (b), the subject of two-day orientation courses at various centres throughout U.S.A. where adrenal cortex physiology and the use and misuse of ACTH in human beings is also discussed; (c), being allocated to committees in these centres for distribution among approved research projects. It is hoped that ACTH would be available in most U.S.A. hospitals within the year.

U.S.A. hospitals within the year. It will be recalled that ACTH is the hormone secreted by the pituitary gland which has the property of stimulating the cortex of the adrenal gland to secrete cortisone. It has been estimated that the anterior pituitary gland from 40,000 pigs is required to produce 1 lb. ACTH. The reason for this low yield is, as Vogt points out (Brit. Med. J., 1950, No. 4673, 285) in connection with cortisone, that the pituitary and adrenal glands do not store hormones. For example, the adrenal cortex secretes seven times more cortisone per minute than it contains. Further, blood is not a suitable source of cortisone because of its rapid absorption by the tissues.

These two simultaneous statements reflect the enormous energy being thrown into the problem in U.S.A. The increased availability of cortisone is not only reflected in the fall of price, as mentioned above, but in the fact that whereas, for-merly the small amounts available were conserved by administration by intramuscular injection, it is now available in 100 mg. tablets for peroral administration. Iveburg et al. (Science, 1950, 112, 429) report that cortisone is equally effective administered perorally whether parenterally.

Because of the relative inaccessibility of cortisone, especially in the United Kingdom, it is natural that a number of structurally related steroids should be screened for cortisone-like action. Such investiga-tions have been reported during 1950 by Spies (Lancet, 12 November 1949, 980; ibid, 7 January 1950, 11); by Stock & Clure (Lancet, 1950, ii, 125), by Polley & Mason (J. Amer. Med. Ass., 1950, 143 (17), 1474). Dodds et al. (Brit. Med. J., 1950, No. 4684, 849) also investigated a series of steroids including cortisone, androstenediene, dehydro-iso-androsterone, progesterone, pregnenolone, and pregnadienolone. None, other than cortisone, was found to have any anti-rheumatoid arthritic effect as judged by a carefully devised series of tests.

The broad conclusion to be drawn from all these investigations is that the chemical structure of cortisone is specific for the symptomatic relief of rheumatoid arthritis. The closely related Compound F (17-hydroxycorticosterone), alone, has a comparable action.

The summarised requirements are that, to have anti-rheumatoid arthritis effect, a steroid should possess the following combination of structural features:

(a) a hydroxyl group at C17.

(b) a ketone or hydroxyl group at C" (c) a double bond between C' and C'.

(d) a ketone group at C<sup>3</sup>.
(e) a ketone group at C<sup>30</sup>.
(f) hydroxyl groups at C<sup>17</sup> and C<sup>31</sup>.

Cortisone and Compound F (17-hydroxy-corticosterone) are the only known com-

pounds to possess these structural features.

It will be seen that pregnenolone for which some anti-rheumatic effect has been claimed, but which is now considered to be without such action, does not satisfy the above combination of structural features

Abelson and Moyes (Lancet, 1950, ii, 50) suggest the use of ephedrine as a screening agent for substances in the search for cortisone-like action. There is evidence that adrenaline and ACTH produce cosinopenia by liberation of glucocorticoids (of which cortisone is one) from the This adrenaline-like adrenal cortex. action on eosinophils has been used to follow ACTH treatment and as a measure of adrenal cortical function in Addison's disease and for screening substances suspected to have ACTH-like activity (Spies and Stone, Lancet, 1949, ii, 980). The authors found that ephedrine, which may be administered orally, produced a significant eosinopenia and suggest its use as an alternative standard whilst ACTH is itself so scarce.

Increased availability of cortisone has enabled an increased understanding in its clinical use and in the risks of undesirable inconside-reactions-which are not siderable.

The field of application is now pretty clearly defined to be in the treatment of diseases involving mesenchymal tissues (the so-called collageu diseases) such as rheumatoid arthritis, lupus erythematosis, rheumatic fever, certain allergic conditions including allergic asthma, certain skin diseases such as exfoliative dermatitis, etc. Beneficial effects, which have sometimes been dramatic, have been experienced by sufferers from these diseases. Transitory, tho por lym S

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though marked, benefits have been reported in the treatment of acute leukemia, lymphosarcoma, Hodgkin's disease, etc.

Spies et al. (Lancet, 1950, ii, 241) regards cortisone as an interesting new tool to supplement the use of nitrogen mustards (referred to later in this review), folic acid antagonists, and radioactive compounds in the treatment of various carcinomas. The possibility of response in carcinoma is unpredictable; but Spies and his colleagues report amelioration in some cases of inoperable carcinoma, acute leukemia, and lymphosarcoma. The amelioration was secured although the diseases did not disappear from objective evidence. The cases pose some profound problems in connection with the body's defence and regulatory mechanism which open up broad vistas.

Among the side-effects now noted in Antong the side-reference in Now Bottom and Cortisone therapy are mild acne, mild hirsutism, "moon-face" (rounding of facial contours), hyperpigmentation, etc. (e.g. Behrman and Goodman, J. Amer. Med. Ass., 1950, 144 (3), 218. Chapman and M Kirk, J. Amer. Med. Ass., 1950, 144 (1), 65) report water retention following cortisone therapy but no other interference with liver function with the possible exception of fat deposition. Westman (Lancet, 1950, ii, 541) confirms the findings of other workers that ACTH promotes fatty infiltration of the liver in experi-mental animals. In another type of sidereaction in cortisone therapy Hoefer and Glaser (J. Amer. Med. Ass., 1950, 143 (7), 621) have made a preliminary study of the powerful neuropsychiatric disturbances, which follow its administration, using the electroencephalogram.

## Effects Wound Healing

Haber et al. (Science, 1950, 112, 335) have made a physiological study of cortisone using the mouse as a test-animal. Confirming the earlier findings of Ragan et al. (Proc. Soc. Biol. Med., 1950, 27, 718) these workers confirmed the earlier chance observation that cortisone interfered profoundly with the process of wound healing. The effect seems to be maximal when cortisone is injected shortly after the initiation of the healing mechanism. Cortisone seemed to have little effect on existing granulation tissue. It was also found that by a mechanism which was not clear, cortisone interfered with macro-phage function. The authors express the view that, because of the inhibition of tissue response and the retardation of macrophage response, cortisone alone might be regarded as contraindicated in tuberculosis where these mechanisms must operate effectively for alleviation of the tubercular condition to be secured.

## Large Doses Act Differently

Kelemen et al. (Lancet, 1950, ii, 457) have offered a preliminary report on an observation that large doses of salicylate act differently from small doses in that the body's non-specific defence mechanism is remarkably stimulated. They believe that both adrenaline and the cortical hormones are involved in the reaction. Further exposition of this problem will be awaited with interest if only because salicylate, in sufficiently massive dosage to attain and maintain a plasma level of 30 to 40 mg. per 100 mls., is now regarded as a specific curative agent in rheumatic fever; it is interesting that in the treatment of this disease cortisone exerts some of its most dramatic effects.

Li et al. reported at the first Congress of Biochemistry in 1949 that they had obtained from a peptic digest of ACTH a peptide with a small number of animo groups which showed ACTH-like activity. This is generally considered to hold out hopes that substances with such activity may eventually be synthesised. Li's polypeptide probably contains 6, 7 or 8 animo acid residues. Morris and his colleagues (Biochem, J., 1950, 46, 173) have indicated that Li's polypeptide may be present in the preparation of active hormones from the pituitary gland in a free form which may be separated from other constituents by the use of the ultracentrifuge.

Geschwind et al. (Science, 1950, 112, 436) report the extraction of fresh sheep pituitary gland, in the cold with trichloracetic acid, the removal of the acid from the extract with ether and the subsequent chromatography and elution of a fluorescent substance. A quantity of this substance which has an activity equivalent to 170 mg. of a standard ACTH protein is the yield by such processing from 1 Kg. fresh sheep glands.

The use of a combination of desoxy-corticosterone acelate and ascorbic acid in the symptomatic relief of rheumatoid arthritis, first introduced by Lewin and Wassén (Lancet, 1949, ii, 993), the efficacy of which has been emphatically affirmed and equally emphatically denied in the British literature, has now been investigated in U.S.A. by Kling (J. Amer. Med. Ass., 1950, 143 (9), 79). The American workers secured striking amelioration for varying periods after the injection. They regarded the treatment, however, as hazardous because of the development of

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hypertension and muscular weakness as a consequence of low potassium serum levels which are induced. The contradictory reports regarding the efficacy of this treatment are such that there is clearly an anomaly somewhere which awaits resolution. Undoubtedly, one of the confusing features is objectivity-or lack of it-in the assessment of improvement of the arthritic condition. The British workers at the Rheumatism Research Centre at Manchester have been foremost in the establishment of rigid standards of assessment, a need the greater in U.K. because of the scarcity of cortisone and ACTH and the urge to seek out alternative drugs Janus sums up with similar activity. these objective standards of assessment in a recent paper (Brit. Med. J., 1950, No. 4691, 1444). A similar set of standards were postulated by Dodds and his coworkers in a paper already referred to above (Brit. Med. J., 1950, No. 4684, 849).

It is not surprising that attempts to prepare corticosteroids by biosynthetic methods have been made. McGinty et al. (Science, 1950, 112, 506) have shown that Reichstein's Compound S (which is 11-desoxy-17-hydroxycorticosterone may be converted to Kendall's Compound F (which is the only steroid known to have biological activity similar to cortisone) by biosynthetic techniques involving the incubation of hemogenised beef adrenal glands in a nutrient medium in which 11-desoxy-17-hydroxycorticosterone was suspended.

Chromatographic separations and biological assay showed that 50 per cent of the Compound S was converted to Compound F in three hours incubation.

Seneca et al. (Science, 1950, 112, 524), drawing an analogy with the (claimed and contradicted) successful treatment of rheumatoid arthritis with desoxycorticosterone and ascorbic acid, reasoned that cortisone could possibly be synthesised from desoxycorticosterone, or its precursors by oxidising and reducing agents in conjunction with the oxidation-reduction enzyme systems of the adrenal cortical cells. Their technique involved the incubation of slices of fresh, sterile adrenal cortex in a suitably enriched nutrient medium containing the precursor. Penicillin G was added to maintain sterility. Cortisone was actually biosynthesised, the most potent preparations being obtained from a medium containing desoxycorticosterone, insulin, ascorbic acid and certain members of the vitamin B complex. Slices from the adrenal cortex of the cat and man gave the most satisfactory results; whilst the adrenal cortex of the chicken gave negative results.

An interesting observation made in Holland by de Vries et al. (Lancet, 1950, ii, 381) is that ordinary liquorice extract has an ACTH-like effect in subjects with intact adrenal glands. The biochemical pictures of ACTH and the liquorice extract were almost identical; but the latter was found to be useless in the treatment of rheumatoid arthritis. This may be a new

Reichstein's Compound S. No cortisone-like activity.

Kendall's Compound F. Possesses cortisone-like activity.

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starting point for biochemical, physiological and chemical investigations in the corticosteroid field.

It will be seen that very great progress has been made in the knowledge of the character and function of these steroids during the past year; but the potentialities for the curing of disease and the understanding of body mechanisms is such that it is clear that a new vista in biochemistry and physiology will be revealed during the next few years.

## Field of Antibiotics Expands

The field of antibiotics continues to expand although, because of its wide efficacy in the treatment of common infections and because of its astonishing lack of toxicity, penicillin continues to dominate the field. Next to penicillin in importance comes streptomycin, not because of any question of precedence over subsequently developed antibiotics or because of generally greater usefulness, but because of its important application in the treatment of tuberculosis. J. E. McKeen, President of the well-known American company of Chas. Pfizer & Co. has indicated (*Lancet*, 1950, ii, 105) that the manufacture of antibiotics is now one of the major industries in U.S.A. where, it is estimated, some 80 per cent of the world's supplies are made. He considers that 30 per cent of the patients passing through the doctors' hands in U.S.A. are treated with antibiotics and, in 1948, almost half the drug bill of the New York hospitals was for penicillin and streptomycin. The value of antibiotics produced in U.S.A. has increased from \$1.00 million in 1942 to \$160 million in 1949.

#### Supremacy of Antibiotics

T. J. Winn (also of Chas. Pfizer & Co.) has indicated elsewhere that \$1.00 out of every \$4.00 spent on prescription drugs is accounted for by antibiotics, or looking at the picture from another direction, the current sales of antibiotics exceed the total sales of hormones, sulpha-drugs, and botanicals put together (Drug & Cos. Ind., 1950, October, p. 472). It would appear that the pattern is established that some 75 per cent of the penicillin used in U.S.A. is distributed via the pharmacy for use by the physician in his consulting rooms or in the house of the patient, the balance being used in hospitals. The reverse situation exists for streptomycin and this probably reflects the greater toxicity of this antibiotic and its principal use in the treatment of hospitalised tuberculosis patients. It is a further interesting feature of the changed and changing economic structure of the pharmaceutical industry in U.S.A. that the so-called "wide-range antibiotics, aureomycin and chloromycetin,

already receive their major distribution for demiciliary use. The reasons would appear to be similar to those which apply in the case of penicillin.

No comparable figures are publicly available to reflect the position in U.K.; but it is reasonable to suppose that by far the greater part of the 20 per cent of the world supplies of antibiotics, not made in U.S.A., originate in U.K. This trade in antibiotics would, thus, have a value in the neighbourhood of £7½ million.

Manufacture of penicillin appears not to be nearly so advanced in other countries as in U.S.A. and U.K. This has exercised the thoughts of the World Health Organisation who attribute the situation to three main factors: (a), absence of trained personnel to correct which they suggest the establishment of Fellowships; (b), inaccessibility of equipment and, (c), fear of capital loss through obsolescence of equipment; concerning the latter such fears are considered groundless because of the ready adaptation of the equipment to the manufacture of new antibiotics. Concerning (b), it is implied that certain equipment, such as the Podbielniak extractor, is inaccessible because of its possible use in concentration of toxins for bacterial warfare, but the Expert Committee consider the risks of such use to be negligible in the light of present knowledge.

The manufacture, chemistry and uses of penicillin and streptomycin have been comprehensively covered in earlier Reviews.

At one time it was hoped that the toxicity of streptomycin, and particularly its neurotoxic effects, might be due to impurities. The hopes were not realised and streptomycin was found to have intrinsic toxic effects at therapeutic dosages for the treatment of tuberculosis. Next, it was hoped that the streptomycin antitubercular effect would be maintained and the safety margin between therapeutic and toxic levels widened by the use of the derivative, dihylrostreptomycin. Whilst these side-effects are somewhat diminished it has now been established that they still occur at levels of dosage which are of therapeutic interest. Heilman et al. (J.

Amer. Med. Ass., 1950, 143 (14), 1223) has now observed that neurotoxic effects are associated with blood serum contents of streptomycin in excess of 60 micrograms per ml.; whilst the maximum safe dose is not yet known it would appear that a concentration maintained at this level or higher over a period of several weeks might damage the vestibular and auditory systems.

## Claimed Most Attention

Elsewhere in the antibiotic field aureomycin, chloromycetin (chloramphenicol), terramycin and neomycin have claimed most attention recently. The two first named drugs were first brought into use in 1948. Terramycin and neomycin were available for trials during the past 12 months in U.S.A. and are undergoing intense appraisal. All four antibiotics are produced by species of mould-like organisms of the actinomycetes group just as is streptomycin.

Aureomycin, a metabolic product of Streptomyces aureofaciens, is fully effective when administered by the peroral route, a point of considerable importance to the comfort of the patient. It is also advantageous that absorption is at a favourable rate and blood levels persistent. The antibiotic is able to cross the blood/brain barrier and it enters the cerebrospinal fluid. It is, therefore, suitable for the treatment of menningitis. Side-reactions of slight nausea and diarrhoea may be eliminated with increased purity of the product. In contrast with penicillin and streptomycin which are considered to be bactericidal in vivo. aureomycin appears to exert a bacteriostatic effect only. Broadly speaking, aureomycin has its greatest range of usefulness against gram-positive organisms. Its bacterial spectrum overlaps that of penicillin and other antibiotics and, for the time being at least, its greatest use may well be in these systemic infections where penicillin resistant strains are involved. These last summarising remarks may be considered to apply to the case of chloromycetin also.

Chloromycetin, which like streptomycin and aureomycin are all-American developments was originally prepared by a fermentation process. It has been characterised and synthesised and synthetic chloromycetin (chloramphenicol) is now made and distributed in U.K. Chloromycetin, which is D(-)-threo-1-p-nitrophenyl-2-dichloroacetamido-propane-1: 8-diol, the first antibiotic to be synthesised on a practical scale, and the first naturally occurring substance with a nitro group to be isolated

Choromycetin (Chloramphenicol)

has already achieved the status of a menograph in "New and Non-official Remedies." The menograph describes tests for identity and purity (J. Amer. Med. Ass., 1950, 14,3 (9), 814). Like aureomycin, chloramphenicol has a low toxicity and may be administered orally to give effective blood levels within 30 minutes of administration. These effective blood levels are well maintained and a 3-gram dose will maintain levels above 10 micrograms per ml. up to, approximately, eight hours.

There is some evidence that paratyphoid is more resistant to chloramphenicol than is typhoid (*Brit. Med. J.*, 1950, No. 4683, 819).

At present respiratory infections are the largest single group of diseases against which aureomycin and chloramphenicol are being directed in U.S.A.; the ricket-tsial diseases against which they are so singularly effective are, of course, not very common in U.S.A. or U.K. Chen et al. (J. Amer. Med. Ass., 1950, 143 (8), 724) have confirmed preliminary observations that aureomycin is effective in the treatment of cases of gonorrhoea which do not respond to penicillin or other forms of medication. Ninety-eight per cent cures are reported with oral administration of the drug and toxic side-reactions are few and not serious.

## Growth Promoting Effect

The animal growth promoting effect of aureomycin was first reported in 1949 (J. Biol. Chem., 1949, 180, 647) and has received sensational treatment at the hands of the lay-press. This is not surprising since so little as 12 mg. aureomycin per 1 lb. feed was found to produce a wellmarked growth response. Stokstad & Jukes are now reported to have established that the effect is independent of the effect of Vitamin B<sub>12</sub> in the mycelium of Streptomyces aureofaciens (which was used in some feeds) or as a contaminant of the antibiotic itself. It is known that both aureomycin and chloramphenicol affect the flora of the intestinal tract. Drawing an analogy with the intestinal sterilising effect of the sulphonamide, succinylsulphathiazole, it is now believed that the growth promoting effect of aureomycin is due to an alteration of the bacterial flora in such a way that what would otherwise be sub-

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optimal quantities of Vitamin B<sub>12</sub> available in the feed, now becomes adequate for the optimum rate of growth of the animal.

Terramycin was first isolated by Finlay and his co-workers and first reported during the past 12 months (Science, 1950, 111, 85). At present it is undergoing intense assessment having been made available for clinical purposes during the past few months only (e.g., J. Amer. Med. Ass., 1950, 143 (1), 1). Its manufacture is the subject of U.S. Patent 2,516,080 in the names of Sobin, Finlay and Kane. The inventors claim that terramycin is produced by a hitherto undescribed species of actinomycote which they have named Streptomyces rinosus. Terramycin appears to resemble aureomycin and chloromyceting

in its wide bacterial spectrum, its mode of action and its antirickettsial effects.

So far the the patent reveals, the growth medium consists of glucose, soyabean meal, sodium chloride and distillers solubles dissolved in distilled water and adjusted to pH 7.0. The antibiotic could be extracted from the metabolic fluid with nbutyl alcohol. The chemical structure of the antibiotic is, as yet, unknown but it is characterised for the purposes of the patent by a series of physical constants. It is amphoteric and substantially insoluble in water and ether.

Melcher et al. (J. Amer. Med. Ass., 1950,

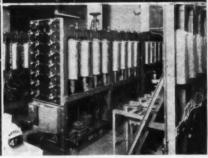
Melcher et al. (J. Amer. Med. Ass., 1950, 113 (15), 1803) report excellent response to terramycin in lobar and virus pneumonia.

(continued overleaf









The original laboratory block of the British Non-Ferrous Metals Research Association, which was destroyed by bombing in 1940, was rebuilt last year and the above photographs appeared in our issue of 4 March, 1950. They show:

1.—Apparatus for continuous measurement and recording of electrode potentials of corroding metal specimens.  The electron diffraction camera used for the identification and examination of corrosion and oxidation products.

3.—Centrifuge for separation of primary constituents from semi-molten metals.

4.—Battery of machines for measuring the resistance to deformation of metals at elevated temperatures (creep).

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The only side-reaction was gastrointestinal irritation which was less than with aureomycin. Hendrichs et al. (J. Amer. Med. Ass., 1950, 143 (1), 4) report a satisfactory cure rate in the treatment of gonorrhoea which is higher than that achieved with chloramphenicol.

## Assessment Slow

Neomycin was isolated by Waksman more than a year ago. Therapeutic assessment, however, has been somewhat slow due to difficulties in producing a potent, non-toxic substance (Hobby et al.; Ann. N.Y. Acad. of Science, 1949, 52, 775; Carr and Pfuetze, J. Amer. Med. Ass., 1950, 144 (1), 65). Temporary damage to renal function and sudden development of partial deafness may limit its usefulness. However, Waksman believes there is evidence that neomycin may prove extremely useful in the treatment of tuberculosis where the infecting organism is, or has become, streptomycin-resistant (Brit. Med. J., 1950. No. 4679, 600).

Hauser and Marlowe (J. Phys. and Colloid Chem., 1950, 54 (8), 1078) offer an appraisement of penicillin and streptomycin in the light of their colloidal behaviour. The authors conclude that the state of aggregation influences their mode of action because the antibiotic micelles attach themselves to the bacterial cellsurface as such and quickly affect the zeta potentials. The adsorptive process is aided by the surface activity of penicillin. Such rapid cell-surface adsorption is regarded as a prerequisite to the subsequent interference with normal cell function. It is wellknown that aluminium stearate delays clearance of penicillin and this is now thought to be due to a protective coating of the penicillin micelles, thus preventing their rapid disintegration and absorption into the blood-stream. The polyvalent aluminium is believed to enhance agglomeration of the penicillin micelles through replacement of the sodium ion; whilst the stearate radical is also believed to enhance adsorptive phenomena. These observations are claimed to be in accordance with Eiseman's recent observation that tuberculostatic drugs such as streptomycin could be made more effective if they could be made more surface active.

The Medical Research Council's Streptomycin in Tuberculosis Trials Committee has now published its final report (Brit. Med. J.. 1950, ii. 1073). The patients treated in this trial, all suffering from progressive bilateral pulmonary tuberculosis, were divided into three groups which were nearly equal. One group (S) received

streptomycin only; a second group (P) received p-aminosalicylic acid only; the third group (SP) received both streptomycin and p-aminosalicylic acid. X-ray examination showed improvement in all groups after three months, but least in the (P) group. The group (SP) showed most favourable results, being slightly more effective than streptomycin alone. The patients in the (SP) group showed a lower incidence of streptomycin resistant strains than the group receiving streptomycin adone.

Pitts et al. (Science, 1950, 112, 149) working on the theory that an agent preventing conjugation of a drug prior to excretion might delay excretion and thus enable suitable plasma levels of the drug to be built up and to be better maintained, have that p-(di-n-propylsulphamyl)benzoic acid, which is known to influence enzymic conjugase systems, demonstrably elevated the plasma levels of p-aminosalicylic acid. The elevation amounted to 1.6 to 4.1 times the level achieved without the use of this interfering drug. p-(di-n-propylsulphamyl)-benzoic acid is insoluble in water, but it is rapidly absorbed from the gastro-intestinal tract. Seventy-five per cent becomes bound to plasma protein and it is excreted subsequently in a conjugated form, possibly the glucuronide. claimed to have a high therapeutic index.

## Indications Contracting

Kirby (J. Amer. Med. Ass., 1950, 144 (3), 233) believes that, because of the increasing availability of aureomycin, chloramphenicol, and terramycin to augment the field of usefulness of the older antibiotics, the indications for sulphonamides are increasingly restricted. He considers that there are only three conditions in which sulphonamides remain the drug of choice. They are: (a) uncomplicated urinary tract infections; (b) bacilliary dysentery; and. (c) menningococcic meningitis. Triple sulphonamide mixtures (long-established in U.K.) have become increasingly used in U.S.A. because of their lessened risk of kidney damage. Lehr (J. Amer. Med. Ass., 1950, No. 4679, 601) has reviewed sulphonamide mixtures in the light of accumulated knowledge.

Despite all thes changing circumstances, work continues on new sulphonamides and one which, it is claimed, is singularly free from the risk of tissue damage, 3:4-dimethyl-5-sulphanilamido-isoxazole, has been introduced in recent months.

This sulphonamide is stated to be readily soluble in neutral or slightly acid body fluids. Seventy per cent is excreted unchanged, whilst 30 per cent is excreted

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3: 4 dimethyl-5-sulphanilamido-isoxazole

after acetylation. The acetylated form has only a slightly less solubility than the free drug, so that crystallisation of the conjugate in the kidney tubules is unlikely. A daily intake of 6 to 7 grams maintains the blood level at 10 to 12 mg. per cent. Unlike sulphanilamide, the new sulphonamide is distributed in the extracellular fluids only and not in the tissues and hence it is therapeutically effective in comparatively small doses. The new chemotherapeutic agent has been found effective in systemic infections including gonorrhoea and it is especially effective in certain urinary infections.

Bigger has contributed two important papers during the past year in connection with antibacterial substances. In the first paper (Lancet, 1950, ii, 46) he studied the action of six substances-sulphathiazole, penicillin, streptomycin, chloromycetin, boric acid and p-aminosalicylic acid taken in pairs, on B. coli in a synthetic medium. He demonstrated the existence of synergism in the case of every combination but one. He also demonstrated antagonism in certain circumstances in five combinations and points out what may be serious practical consequences of this. In the course of the paper, Bigger coins the word "bacteriofrenic" to describe the power of some agents to curb the growth of bacteria; he considers the word "bacteriostatic" to be misapplied, since no substance can hold the number of bacteria quite constant under conditions suitable for their growth.

## The "L" Substance

In his second paper, Bigger (Lancet, 1950, ii, 426) demonstrates the presence in broth of a substance he calls "L substance," which so potentiates the action of sulphathiazole against B. coli that its action becomes bactericidal whereas it would otherwise have been bacteriostatic—or, rather, bacteriofrenic, as Bigger would prefer it. L-substance has been concentrated and partially purified, but not identified. It is basic and is to be found in various body fluids which contain little, if any, sulphonamide antagonists. Bigger suggests, therefore, that it is not necessary to call to aid a theory that the action of sulphonamides is such that, in vivo, it exerts a bacteriostatic (or bacteriofrenic) effect which enables the body's normal

defence mechanisms to act against the infecting organism; he suggests that, with the potentiating action of L-substance, sulphonamides may well be found to be bactericidal in vivo. The identification of L-substance will be awaited with interest, and it may well be that a fresh chapter is about to be opened in the story of chemotherapy.

The chemotherapy of cancer continues to receive close attention but is only one mode of attack on the problem which was debated by the Fine Chemicals Group of the Society of Chemical Industry (e.g., see Pharm. J., 9 December 1950, 380). Haddow pointed out that the treatment of cancer of the prostate and mammary glands with sex hormones achieved limited and variable results. Experimentation with ACTH and cortisone (already referred to in this present review) had proved useful in certain forms of cancer. The use of neurotoxic urethane seems to offer only transitory benefits. The availability of nitrogen mustards has opened up a new field for exploration.

## Use of Nitrogen Mustards

The use of nitrogen mustards has been built up on the fundamental work of the Cambridge school led by Peters which has been discussed in previous annual reviews. Peters showed that the powerful cytotoxic effects of the mustard derivatives was due to interference with the intracellular pyruvate-oxidase enzymic system. The object of their use in cancer therapy is to produce mitotic arrest in the highly proliferative cancer cells without damage to normal body cells and with the minimum of side reactions.

The two compounds at present undergoing most use are di-(2-chloroethyl)-methylamine

and tri-(2-chloroethyl)-amine of which the former is considered least toxic to normal tissues.

The mechanism of the cytotoxic action of these halogenated alkylamines seems to be that the drug undergoes intramolecular cyclisation to form an onium ion with the liberation of a chloride ion, thus:—

$$\mathsf{R_2N}.\,\mathsf{CH_2}.\mathsf{CH}_2.\mathsf{Cl} \longrightarrow \boxed{ \mathsf{R_2N} \overset{+}{\diagdown} \overset{\mathsf{CH_2}}{\overset{!}{\mathclap{\mathsf{CI}}}} \overline{\mathsf{Cl}} }$$

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The reactive carbonium ions are readily able to alkylate a variety of functional groups of biological importance. The action of these nitrogen mustards on proliferating cells somewhat resembles that of X-rays and the group of compounds have been variously described as "chemical X-rays" and "radiomimetic" compounds. It is generally conceded that the field of greatest usefulness of nitrogen mustards is in the treatment of Hodgkins disease which has become resistant to radiation. They are, however, palliative in some other forms of cancer.

## Being Examined Further

A substance with a related action which has reached clinical trial stage but which has been referred back for further examination owing to a fatality (*Brit. Med. J.*, 1950, No. 4679, 683) is dimesyloxyalkane or G.T. 41:—

## CH<sub>2</sub>O SO<sub>2</sub> (CH<sub>2</sub>)<sub>4</sub> SO<sub>2</sub> OCH<sub>3</sub>

During 1945 the pure curare alkaloid, d-tubocurarine chloride, was introduced to medicine. It has the property of promoting relaxation of muscles and it has become particularly valuable as an adjunct to anæsthesia especially where relaxation of abdominal muscles is desired. This stimulated a search during the intervening years for more readily accessible synthetic muscle relaxants.

Barlow and Ing (Nature, 1948, 161, 718) compared the great potency of tubocurarine in blocking neuromuscular transmission with that of simple quaternary ammonium salts. The interest in these compounds has its origin as far back as 1915 when Burn and Dale observed the blocking effect of autonomic ganglia by quarternary ammonium compounds. Barlow and Ing concluded that the differences between tubocurarine and quarternary ammonium compounds might be due to two cationic groups, at the two quarternary nitrogen atoms in the alkaloid, at a certain optimum distance apart. They prepared a series of bis-quaternary ammonium salts in which the cationic nitrogen atoms were separated by polymethylene chains of different length. Among such substances are the members of the polymethylene bistrimethyl ammonium series—to the potentialities of which as neuromuscular blocking agents Paton and Zaimis (Nature, 1948, 162, 810) first drew attention—of which one member, originally designated "C.10," which is a-a-bistrimethyl-ammonium decane iodide, has been found to be some five times more potent than d-tubocurarine and with a rather better margin of safety in use.

Interestingly enough two members of

the same series of compounds, penta and hexamethonium bromide are effective antidotes.

Hexamethonium bromide

a-ω-hexamethylene-bistrimethylammonium bromide

Hexamethonium, whilst an antidote to decamethonium, possesses some of its curarising properties. The difference in this action between these closely related compounds seems to depend upon the particular junction in the route of nervous transmission at which acts most effectively. All these drugs are believed to take part in a reaction in which acetylcholine is released at the junction in question.

In addition to these properties, hexamethonium has recently been found to have an effect both on hypertension and also, upon gastric secretion.

Campbell and Robertson (Brit. Med. J., 1950, No. 4683, 804) have found, in preliminary trials, that the oral administration of hexamethonium for from one to five weeks brings down blood pressure which continues at the lowered level even after the discontinuance of the administration of the drug. This suggests that high blood pressure is the consequence of a chain of events which, once ruptured, does not become restored. Kay and Smith (Brit. Med. J., 1950, No. 4683, 807) found that gastric secretion is depressed when hexamethonium is administered orally which confirms results they had obtained earlier by intramuscular administration. Such findings are, of course, of importance in the treatment of gastric and duodenal ulcers which are exacerbated by the combined acid character and peptic activity of the stomach fluid. The mechanism of the action of hexamethonium is not entirely clear and there are undesirable sidereactions.

The general method of synthesis of these bis-quaternary ammonium salts consists of the preparation of the appropriate diamine by the Mendius method of reduction of the corresponding nitriles and methylation with methyl iodide in methanolic caustic soda (Zaimis, Brit. J. Pharmacol., 1950, 5, 424).

The past year has seen the dismissal of the claims that certain antihistaminics could cure the common cold. Such claims nd

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resulted from the work of Brewster in 1947 (Nav. Med. Bull. Wash., 1947, 47, subsequently that of other workers in U.S.A. The claims made were reported comprehensively in last year's review (This journal, 22 April 1950, p. 576) as well as the scepticism with which the claims were held by a considerable body of medical and pharmaceutical opinion both in U.S.A. and U.K. Opportunist exploitation of these drugs in U.S.A. achieved fantastic heights as it anticipated and hoped for favourable re-sults from further careful checks on the claims. The main points of weakness in the original claims were that the tests were either uncontrolled (or insufficiently controlled) or that the statistical treatment of the tests were open to serious criticism.

Very carefully controlled tests have now been completed in this country and in U.S.A. which appear to dispose of any claim that the antihistaminic drugs tested could influence the course of the common cold. Two tests were carried out in U.K. under the auspices of the Medical Research Council (Brit. Med. J., 1950, No. 4676, 425). A further series of tests were carried out, using antistin, by Lorriman and Martin (Brit. Med. J., 1950, No. 4676, 420).

Controlled tests of antihistaminic drugs were carried out concurrently, but independently, in U.S.A. by Hoagland et al. (J. Amer. Med. Ass., 1950, 143 (2), 157). This particular work was conducted against the background of intense publicity directed towards the lay-public by certain manufacturers of antihistaminic drug preparations for "over-the-counter" sales.

## Results Condemnatory

The results from all these carefully planned explorations were similar and condemnatory of the claims. The results themselves underlined the need for the most detailed planning of such experimentation. For example Hoagland and his coworkers have found that 27 per cent of the patients in his tests reported cure of their colds within 24 hours of receiving inert material.

There is, however, some indication that antihistaminic drugs may decrease to some extent the discomfort suffered in the early stages of a cold; but the differences between controlled groups in this connection were of such a small order that they were only just demonstrable by statistical analysis at the accepted levels of statistical significance. Such differences, if indeed real, are considered to be of no practical consequence.

One must not confuse the exceedingly dubious value of antihistaminics in modifying the course of the common cold at any stage with their very real value in the treatment of allergic conditions, including allergic rhinitis—the symptoms of which resemble those of the common cold.

The pharmacological action of antihistaminic compounds has been appraised in a most thoughtful and thought-provoking paper by J. H. Burn (Brit. Med. J., 1950, No. 4681. 691). He points out that most classes of drug have a common pharmacological action which may be its predominant effect, or an effect of subsidiary consequence and, if the latter, it is then regarded as an "untoward effect" or "side reaction."

## **Ouinidine-like Action**

For example some medicinal substances with diverse main effect, such as local anæsthesia, analgesia, spasmolysis, and antihistaminic action have, in common, a quinidine-like action on the heart. The side effects of antihistaminics are, therefore, to be expected; indeed, these drugs may actually be used as local anæsthetics, quinidine substitutes in fibrillation, quinine substitutes in certain conditions, for travel sickness and in the relief of pain. Similarly, Burns points out, local anæsthetics, such as procaine, or analgesics such as pethidine have a not inconsiderable antihistaminic action. The basis of these common properties is that the substances concerned depress the effects of acetylcholine, histamine and adrenaline which control local activity in many tissues. The paper offers a synthesis of pharmacological action which has been long awaited and which will undoubtedly have its influence on the course of action of new drugs with these various characters in the future.

## 1950 Steel Record

STEEL production last year reached the new record figure of 16,293,000 tons, compared with 15,553,000 tons in 1949, and 14,877.000 tons in 1948. The total achieved exceeded the upper limit of the target set by the Government's Economic Survey by 292,700. The year ended with output in December at an annual rate of 15,408,000 tons—the highest figure ever attained in this month.

Production of pig-iron was also higher in December than in the previous month, while the total output for the year was 9.633,000 tons as against 9,499,000 tons in 1949.

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## CHEMICAL IMPORTS IN NOVEMBER

N OVEMBER imports of chemicals, drugs, dyes and colours, although nearly £1.5 million more than the same month of last year, were not much higher than the October value. Notable increases included in the total of £3,471,075, as shown in Trade and Navigation Accounts of the United Kingdom, were: Boric acid £22,838 (£10,126); calcium carbide £47,073 (£40); fertilisers £231,878 (£22,288); sodium nitrate £152,168 (£105,994); synthetic organic dyestuffs £137,165 (£80,666); sulphur £1,761,598 (£1,290,757).

Among the decreases were: carbon black £156,658 (£303,167); gas and chemical machinery £10,472 (£203,136); value of paints and extenders £290,447 (£425,295); potassium sulphate £35.418 (£42.471).

Acetic anhydride					Nov., 1950	Nov., 1949
Borax	A antic amburdat	a.			Cwt.	Cwt.
Borax	Rorie said	ue .		***	0,998	
Borax	Compolio acid	444 . 1		***	9,300	4,000
Cyst.   Cyst.   19,900   22,80   Calcium carbide   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540   2,80   36,540	Carbone acid			-0.0	1,795	000.000
Borax	A SMIG OI SII C	tner sor	ts of a	reid		
Fertilisers						
Fertilisers	Borax	***		***		
Fertilisers	Calcium carbid	e .				20
Fertilisers	Cobalt oxides	***	***	***	357	266
Color   Colo						Tons
Giycol ethers and glycol etheresters casters	Fertilisers	***	***	***		1,000
Sesters					Lb.	Lb.
Potassium chloride	Glycol ethers	and glyc	ol etl	her-		
Potassium chloride	esters	***		***	266,165	145,853
Potassium chloride	Iodine	444		***	78,705	_
Potassium sulphate					Curt	Cort
Potassium sulphate	Potassium chlo	ride				738 579
All other potassium compounds   Value of all potassium compounds   Libbar   Libbar	Potassium suln	hate		***	37 180	
Value of all potassium compounds	All other notes	sium co	mpou	nds		
Sodium nitrate	Value of all	notessi	170 04	0.000-	41,001	2,020
Cwt.   Cwt.   152,023   120,00     All other sodium compounds   Value of elemical manufactures, etc., all other sorts   274,250   £126,31     Synthetic organic dyestuffs   Cwt.   Cwt.     Extracts for dyeing   1,091   2,02     Extracts for dyeing   1,091   2,02     Extracts for tanning (solid or liquid)   105,932   61,86     All other dyes and dyestuffs   329   20     Earth colours (except black)   21,212   16,34     Carbon blacks (from natural gas)   21,212   16,34     Carbon blacks (from natural gas)   21,212   16,34     Carbon blacks (from natural gas)   21,212   21,034     Carbon blacks (from natural gas)   21,212   21,034     Carbon blacks (from natural gas)   21,212   21,034     Carbon blacks (from natural gas)   24,935   72,22     Value of earbon blacks   2506,658   2008,100     Value of paints and extenders   290,447   2425,29     Value of carbon blacks   23,471,075   24,064,16     Lb.   L	nounds	Posessi	ann or		6689 880	£633 60A
Sodium nitrate	pounds			***		
All other sodium compounds   Value of chemical manufactures, etc., all other sorts   274,250   £126,31	0 - 41					
Value of all sodium compounds Value of chemical manufactures, etc., all other sorts         £274,250         £126,31           Synthetic organic dyestuffs         Cwt.         Cwt.           Extracts for dyeing         1,091         2,02           Extracts for tanning (solid or liquid)         10,592         61,86           All other dyes and dyestuffs         329         20           Earth colours (except black)         21,212         16,34           Carbon blacks (from natural gas)         34,935         72,22           Value of carbon blacks         5156,658         5303,16           Other blacks, including vegetable, lamp, acetylene and bone         9,228         15,41           Value of carbon blacks         29,244         245,29           Value of chemicals, drugs, dres and colours         23,471,075         £2,064,16           Essential oils (other than turpentine)         438,876         348,04           Value of essential oils         488,9045         2333,98           Synthetic oils         7,526         3,06           Wincral jelly         0,00         0,00           Wax, petroleum: paraffin wax         41,208         15,73						
Value of chemical manufactures, etc., all other sorts   Cwt.   Cwt.   Cwt.   Cwt.   L499   Cwt.   L499   Cwt.   L499	All other sodiu	m comp	ound			
tures, etc., all other sorts         £781,234         £338,46           Synthetic organic dyestuffs         1,499         65           Extracts for dyeing         1,091         2,02           Extracts for tanning (solid or liquid)         105,932         61,86           All other dyes and dyestuffs         329         20           Earth colours (except black)         21,212         16,34           Carbon blacks (from natural gas)         34,935         72,22           Value of carbon blacks         5156,658         5303,16           Other blacks, including vegetable, lamp, acetylene and bone         29,228         15,41           Value of paints and extenders Value of chemicals, drugs, drea and colours         23,471,075         £2,664,16           Essential oils (other than turpentine)         438,876         348,04           Value of essential oils         £489,045         £233,98           Lb.         Lb.         Lb.           Lb.         Lb.         Lb.           Lb.         Lb.         Lb.           Walue of essential oils         £489,045         £233,98           Lib.         Lb.         Lb.           Lb.         Lb.         Lb.           Lb.         Lb.         Lb. <t< td=""><td>Value of ch</td><td>emical i</td><td>mpou</td><td>inds</td><td>£274,250</td><td>£126,313</td></t<>	Value of ch	emical i	mpou	inds	£274,250	£126,313
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Synthetic organic dyestuffs   1,499   65   Extracts for dyeing   1,091   2,020   Extracts for tanning (solid or liquid)   105,932   61,86   All other dyes and dyestuffs   22,121   16,34   Earth colours (except black)   21,212   26,303,16   Earth colours (except black)   21,212   26,303,16   Earth colours (except black)   21,212   26,303,16   Earth colours   24,935   27,222   Earth colours   24,935   Eart colours   24,935   Earth colours   24,935   Earth colours   24,935   Earth colours   24,935   Eart colours   24,935   Earth colours   24,935   Earth colours   24,935   Earth colours   24,935		-				
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Iduid)	Extracts for d	yeing	/ TI.	***	1,091	2,029
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Earth colours (except black)		and deep	· · · · · · · · ·	***		
Carbon blacks (from natural gas)   34,935   72,22   303,16   72,22					329	200
243   Value of carbon blacks   2156,658   2303,165   2508,166,658   2303,165   245,269   245,2					21,212	16,341
Value of earbon blacks   \$156,658   Covt.					04.005	W/A 001
Other blacks, including vegetable, lamp, acetylene and bone   Value of paints and extenders   Value of chemicals, drugs, dyes and colours     £3,471,075   £2,664,16   Lb.   L	gas)	***		***		
Value of paints and extenders   Value of chemicals, drugs, drys and colours   £3,471,075   £2,064,216   £45,216   £45,216   £45,216   £45,216   £45,216   £45,045	value of car	bon blac	KS	***	£156,658	£303,167
Value of paints and extenders   Value of chemicals, drugs, drys and colours   £3,471,075   £2,064,216   £45,216   £45,216   £45,216   £45,216   £45,216   £45,045	Other blacks,	meludi	ng v	ege-	Cwt.	Cwt.
Value of paints and extenders         £290,447         £425,29           Value of chemicals, drugs, dyes and colours         £3,471,075         £2,064,16           Essential oils (other than turpentine)         488,876         348,045           Value of essential oils         £489,045         £233,38           Synthetic oils         7,526         3,06           Cwt.         Cwt.         Cwt.           Mineral jelly         12,249         30,30           Wax, petroleum: paraffin wax         41,208         15,73	table, lam					
Value of chemicals, drugs, drys and colours   £3,471,075   £2,064,16   Lb.		***			9,228	15,415
Age and colours	Value of pair	nts and	exten	ders	£290,447	£425,295
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Synthetic oils	turnentine)	o (Outr	or e	Henry	498 876	948 045
Synthetic oils	Value of esse	ntial oil		xxx	6480.045	2000 000
Mineral jelly         Cwt.         Cwt.         Cwt.           Wax, petroleum: paraffin wax         12,249         30,30           41,208         15,73	vanie of case	mercal OH	9	***	Th	T.h
Mineral jelly         Cwt.         Cwt.         Cwt.           Wax, petroleum: paraffin wax         12,249         30,30           41,208         15,73	Synthetic oile				7 598	2 060
Mineral jelly 12,249 30,30 Wax, petroleum: paraffin wax 41,208 15,73						
Wax, petroleum: paraffin wax 41,208 15,73	Minoral teller				10 040	20.204
Value of oils, fats and resins 612 454 147 60 805 15	Way potrolou	m t more	· Alen	10.00	41 900	15 799
	Walna of oils	fote and	month.	W 65 X	619 454 147	20,730
	value of oils,	rate and	resin		212,404,147	29,090,107

		Tons	Tons
Aluminium oxide (crude, 1	un-		
ground)		1,259	566
Silicon carbide (ground	OF		
graded)		1,111	567
Asbestos, raw and fibres	***	9,961	8.534
Diatomaceous earth	***	4,451	4.679
Graphite (plumbago), natu		4,404	2,010
and artificial		1,274	1,256
Magnesite		1,148	436
Sulphur	***	35,236	37,507
Value of sulphur	***	383,798	364,448
Value of non-metallifer		000,100	004,440
mining and quarry produ		£1,761,593	£1,290,757
mining and dustry broad	ICES		
		Cwt.	Cwt.
Plastic materials	***	18,018	16,533
Value	***	£431,354	£438,221

## New Process Cuts Cost

INDUSTRIAL alcohol can be produced from grain by a new mould process at less cost than by the traditional malt process, according to the U.S. Department of Agriculture.

A plant using 12,000 bushels of grain a day could save more than \$1000 in each day's operations by shifting to the new process, which uses a mould product called fungal amylase in place of malt, the Department says. This estimated saving was calculated on the basis of commercial-scale experiments at an Iowa distillery.

The new fungal amylase process was developed by the Department's Bureau of Agricultural and Industrial Chemistry, which co-operated in the commercial trials. Bureau scientists first worked out means of using the mould enzyme to replace malt on a pilot-plant scale at the Northern Regional Research Laboratory at Peoria, Illinois.

On the basis of these experiments Government scientists believe that the use of fungal amylase is practical when certain additions and alterations, chiefly of a minor nature, are made in distillery equipment and procedures. Meanwhile, research at the Bureau's Northern Laboratory to further improve the process is continuing. However, the tests re-ported so far show that yields of alcohol with fungal amylase from either sound or heat-damaged maize are at least equal to yields obtained when malt it used. The mould enzyme had no adverse effect on distilling operations or on the quality of the alcohol. Byproduct livestock feeds obtained with fungal amylase were practically identical with those from the usual malt process.

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# Growth of Thermoplastic Extrusion

## Importance to the Chemical Industry

By Edwin G. Fisher

Of the many processes now available for the manipulation of thermoplastics the extrusion process is probably the most versatile, and in consequence has experienced many changes during its relatively short life as an industrial process.

Started during the early war years, using flexible vinyls and polyethylene for the insulation of wires and cables, the process gradually gained importance, until at the termination of hostilities there were a large number of specially designed extruders in operation on tube and wire products of national importance.

With the sudden cessation of war contracts, work had to be found for this large production capacity and the shortage of many materials, such as leather, rubber and textiles, gave the opportunity to introduce extruded plastics to home and export markets as substitutes. Whenever there was a requirement for flexible or semi-flexible materials in continuous lengths, the physical requirements of which were in any way applicable, attempts were made to use extruded thermoplastics.

Of all the attempted applications made at this time, some were successful but many also were failures. This, coupled with the gradual return of the original materials, tended to bring extruded plastics into disfavour. Other outlets were, therefore, sought for the even further increased number of extruders now in operation.

## Invaluable Lessons Learned

Despite the many failures of these early days, the lessons learnt were invaluable. As a result, attention was directed towards applications likely to have steady and increasing markets, emphasis being on only utilising synthetic resins where their unique qualities rendered them particularly suitable rather than as substitutes. The gradual realisation, which was taking place in industry at this time, that thermoplastic synthetic resins possessed these unique properties and, correctly used, had advantages over many older materials, brought again increasing demands for extruded products of a different class.

One of the most important of these applications was in the use of extruded thermoplastic tubing for the conveyance of liquid foodstuffs and difficult materials

such as corrosives. Pipes and tubes composed of inert synthetic resins were found to have considerable advantages, with their useful temperature ranges, over metallic tubes and tubes manufactured from many other resistant materials. This was of course, particularly true when handling reactive substances whose freedom from metallic and other contaminations was important.

### Millions of Yards in Use

In this country, small bore brewery pipes and stand pipes extruded from the synthetic resin polyethylene were among the first of such products to become widely adopted, and today millions of yards of such piping is in continual use. As the knowledge of the technique of extrusion increased, the manufacturers of this small bore tubing were able to extend their range of sizes until today complete pipework systems in extruded and fabricated polyethylene pipe are available.

Unfortunately polyethylene, although readily extrudable into accurate tubes and pipes and an admirable material in many ways, is not without its disadvantages. It lacks structural rigidity, is not unaffected by many hydrocarbons, and is, moreover, subject to stress cracking.

For these and other reasons, polyethylene pipework cannot be considered to supply the complete answer to the chemical engineer's pipe problems. There should be available for his use complete ranges of pipes and pipe fittings in a number of alternative synthetic resins,



[Courtesy of Rediweld, Ltd.

Expansion piece in polyethylene extruded tubing showing welded joints

<sup>\*</sup> Chief of Extrusion Development, R. H. Windsor,

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such as unplasticised polyvinyl chloride, polystyrene, cellulose acetate, cellulose acetate butyrate, and possibly in due course nylon, for example, in addition to polyethylene. Thus, from his knowledge of the problem and from published technical data on the properties of the various thermoplastics, he would be able to select the most suitable material for his needs.

Such an ideal service as this would appear, at first sight, to be a dream of the distant future. That this is not so, however, is apparent from the fact that rigid vinyl pipes, produced on ram or by multi-screw extruders, were in use in Germany as long ago as 1938 and that pipes in saran, cellulose acetate butyrate, and other plastics have been used in the U.S.A. for some years.

#### Difficult and Uncertain

The accurate extrusion of many of these thermoplastics on single-screw extruders, which until recently was the only type available to users in this country, is, however, a difficult and uncertain task. This is particularly true when the manufacture of medium and large size tubes and pipes is required, and in consequence the availability of the ideal range of thermoplastic piping has been delayed.

plastic piping has been delayed.

The recent introduction of a range of multi-screw extrusion machines, based on the designs of the Italian inventor Colombo, is likely to change this picture completely. Using these machines, the manufacturer can undertake the extrusion of "difficult" materials and be certain of success. He can, for example, extrude unplasticised vinyls, polystyrene and cellulose acetate with little or no more trouble than he would normally expect in handling soft PVC and, given suitable extrusion dies and take off systems, could easily undertake the production of tubes and when metaling in these and other metalials.

and pipes in these and other materials. It is well known, of course, that the extrusion machine by itself does not supply the complete answer and that the techniques of take off and subsequent handling is equally important. The fact, however, that many of the difficulties of achieving a uniform flow of correctly processed stock have been overcome, is an

important step forward.

Thus it can be seen that, as a result of increased experience on the part of manufacturers of extruded products, added to successful development work by machine producers and raw material suppliers, the range of useful extruded thermoplastic products will rapidly increase, and it is thought that the new products will have the greatest field of usefulness in the chemical plant industry.

## **DUTCH DEVELOPMENTS**

HE American restrictions on sulphur A exports have already influenced some branches of the chemical industry in Holland. This is the case in the superphosphate industry, although the latter depends on direct supplies of elementary sulphur only to a slight degree because the Dutch sulphuric acid production is mostly based on pyrites. Furthermore, the rapidly expanding output by the chamber process was until recently expected to bring up the total acid production to the pre-war level of 500,000 metric tons and to satisfy the current needs. Nevertheless, the reduced deliveries of the acid by Belgian manufacturers-in Belgium sulphur forms the basis-to the Dutch superphosphate makers in the southern part of the country has caused a reduction in output.

Production of superphosphates in Holland amounts to more than 800,000 tons per year and this is more than adequate for internal needs. As a matter of fact they represent one of the foremost barter items in Holland's foreign trade.

## Programme Unaffected

The ambitious programme for increasing nitrogen fertilisers and especially sulphate of ammonia, remains thus far unaffected and so does also that of the variegated byproducts programme. The daily coke production is expected to be stepped up to some 15,000 tons or by some 50 per cent. A phthalic acid anhydride factory with a capacity of some 18,000 tons a year will shortly be in commission as a basis for the important Dutch lacquer and varnish industry, while a urea factory is expected to start its production in 1951 with a capacity of 6,000 tons. Large scale production of synthetic phenol now becomes a practical consideration; plants for preparing 100 per cent naphthalene, anthracene and carbazole and for the commercial production of soda and sodium chloride are under way. It is expected that Holland will soon be able to produce 50 per cent of her soda ash needs, while an output rate of some 40,000 tons per year of caustic soda by salt electrolysis may soon be reached. Salt forms an outstanding national raw material in the inorganic chemical industry in Holland (where coal and petroleum favour the development in the organic field), and Dutch salt electrolysis capacity has been tripled since the last war.

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## **INSECTICIDES IN 1950**

## By a SPECIAL CORRESPONDENT

If the most notable items of progress were picked out, then perhaps the first three would be: (1) commercial production of allethrin, the pseudo-synthetic pyrethrum: (2) the further development of purer gamma-BHC products; and (3) sharply increased attention to the toxic

hazards of new insecticides.

Allethrin was certainly expected to require a much lengthier pilot-scale stage of development before commercial pro-duction became a fact. It was only in 1948/49 that the laboratory synthesis was reported; even the selected name of allethrin was a 1950 event. It is, incidentally, a name to be commended, for it makes no attempt to suggest that allethrin is a synthetic form of the natural pyrethrum. The substance is, of course, no more than a close chemical relation (the allyl homologue) of cinerin I, one of the four known active constituents of The synthesis is cumbersome; according to early reports, 200 lb. of material must be handled for every finally produced. pound of allethrin finally produced. Allethrin is not, therefore, a cheap synthetic; however, it is said to be 10 per cent or 15 per cent less costly than natural pyrethrum concentrates of "the same" toxic strength. The inverted commas are necessary because it is clear from 1950 tests with allethrin and pyrethrum that comparison of their insect toxicities is exceedingly difficult.

#### Not Consistently Pure

The commercial supplies would not appear to be consistently pure, small amounts of simpler chemical substances being present. A useful advantage over pyrethrum is that allethrin concentrates are more stable in storage; though it may well be remarked that a natural and imported material must be stored to a much greater extent than a synthetic substitute manufactured at home. A clearcut disadvantage is that allethrin is less responsive to synergists than is pyrethrum.8 Both American and British tests comparing toxicities of allethrin and pyrethrum have shown that the relative effects depend upon the test insect chosen. That is, there is no factor of comparison that holds good over a wide range of insects. This is exceedingly puzzling in view of the very close chemical similarity of the synthetic and natural substances.

The British work reported in 1950 would seem to have been carried out with laboratory-prepared materials.4 Not only was pure allethrin compared with pyrethrum, but a semi-synthetic form of This is the ester allethrin was tested. built up from the synthesised alcohol and the natural acid (chrysanthemum monocarboxylic acid) extracted from pyrethrum. The toxicity of the semi-synthetic substance differed from that of the fully synthetic substance.

Summing up, it may be said that opinion in 1950 hardened to the broad generalisation that allethrin is a good pyrethrum-like insecticide, but that it will never be as good as natural pyrethrum.

#### Purer Form Desirable

desirability of producing purer forms of the BHC gamma-isomer has been increasingly realised in recent years. other isomers always produced when BHC is prepared are only feebly insecticidal, but they are responsible for the musty taste and odour which crude BHC carries and which it has tended to pass on to foodstuffs as a taint. The use of BHC has been limited to circumstances of application in which the taint problem cannot arise. Fears that the purer gamma-isomer could not be commercially produced except at an uneconomic price have been dispelled during 1950. The name lindane has been given to the pure gamma-product in America. Numbers of tests have been reported showing that lindane can be successfully used without passing on taints to the final produce; to quote one recent paper, it has been shown that gamma-BHC applications can be made to the soil for wireworm control at the time of transplanting tomato plants and the subsequent fruit is free from BHC odour or flavour. There would still seem to be some risk of off-flavour development, however, with citrus fruit if gamma-BHC spraying takes place when fruit has formed on the trees; tests have shown that freedom from taint is secured of the gamma-BHC is used as a wettable powder, but not if made up in an oil formulation."

It is obviously difficult to assess the extent to which the taint disadvantage can be eliminated. The materials which have been used for tests so far reported are "purer forms of gamma-BHC," but their purity standard varies. It might be said that a delicate problem of practical technology is being worked out—how pure must a predominantly gamma-isomer BHC be to eliminate many of the former taint troubles? Commercially a choice

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between crude BHC and 99.5 per cent gamma-BHC may not be desirable. For many purposes the taint nuisance of crude BHC may be overcome if some product of intermediate gamma-purity is used. The high purity standard may be required for only a few types of application. But too many partially pure BHC products between the two extremes will lead to problems of description and uncertainty. This is a problem that 1950 reports have presented and it will have to be left to the future. It may be considerably reduced as a problem if the costs of producing high purity gamma-BHC can be lowered. The fact that insect toxicity increases with purity is a helpful influence in this direction.

#### Less Crude Forms Used

The arrival of purer BHC has not been witnessed only in America. Though in Britain no distinctive name yet exists, less crude forms of "Gammexane" have been used for new "Gammexane" based products. A dispersible BHC wettable powder is now available as a spring insecticide for fruit, and it is claimed that it enables growers to dispense with any kind of winter wash, tar oil, petroleum oil, or a DNC-oil combination. In the full spraying programme for commercial orchards, the new BHC spray cuts out one spraying operation, reduces the variety of insecticidal materials required to two (BHC and parathion), and is said to reduce total cost of control by 40 per cent to 50 per cent. The parathion spraying is necessary as the succession of spring BHC treatments does not control red spider. It may be objected that a DNCpetroleum oil winter wash does control red spider. However, this control is only partial, and with the increases in red spider infestation (which have followed DDT use) many growers have found that DNC is ineffective; it is, in any case, useless as a prevention for re-invasion of fruit trees by red spider.

While on the subject of BHC, it may be mentioned that this has been the insecticide mainly used in Africa to control the serious locust infestations of 1950. Very large tonnages are said to have been employed and with excellent effect.

The toxicity of insecticides to other life than insect life has received greatly increased attention on both sides of the Atlantic. In the United States, the dominant theme has been the toxicity of residues upon foodstuffs. The Food and Drug Administration Hearings (called to determine the tolerances for residues which may in future be allowed by the

Administration) began early in 1950 and proceeded voluminously through the year. Over 150 insecticides or other chemicals used in control of crop diseases have been listed for detailed consideration. So far, however, only the first stage of these hearings has been completed; in this, the evidence that insecticidal substances are indispensable for food production has been put forward. It was believed at one time that the schedule of tolerances would be ready by 1951, but the latest reports indicate that such decisions cannot now be reached before the 1952 crop-spraying season.

The hearings have had a marked effect upon development. They have put a brake upon the pace of American initiation of new insecticides; for the pioneering of new synthetic substances is expensive and companies with further projects in their research files have tended to cold-store them until the results of the hearings are known. Looking back upon the almost undue haste of development in 1945-49, probably all observers would agree that this reflective period will be beneficial.

In Britain, attention has been directed to the toxic hazards of new insecticides during handling and spraying. In particular, the human toxicity of the organophosphorus insecticides has been examined—HETP, TEPP, parathion, and the new systemic substances. Early in the year two medical interventions stressed the urgent need for caution in the use of these materials. These were the Report of the Medical Research Council' and Dr. Hunter's comprehensive paper in the British Medical Journal."

## Warnings Underlined

The deaths of two spraying opera-tives in June during the application of DNOC for weedkilling underlined Ministry these warnings and the of Agriculture set up a working party consider the general question of toxic hazards with poisonous agricultural chemicals. An early result was the excel-lent Advisory Leaflet, 374, "Precautions in the Use of Insecticides, Fungicides, and Weedkillers." It states the crux of the modern problem in these words: "Some of the newer materials, however, present special problems, because they may cause poisoning not only if taken through the mouth or inhaled in the form of spray or dust, but also by absorption through the skin. Certain of them are more persistent than the older insecticides and repeatedly small doses (the early effects of which may be less readily detected) may in some cases

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have a cumulative effect." It is satisfactory to report that the manufacturing industry responded to the growing sense of public and official disquiet with an even greater attention to precautionary statements and literature; Dr. Ripper has provided a most notable paper" upon safetymeasures for spraying operations in which a multi-point code for practice is set out. Dr. Ripper has urged that legislative measures similar to those operable by the Food and Drug Administration should be created in Britain; although the use of food preserving chemicals is con-trolled by our Food and Drug Act, residues of crop protecting chemicals are not subject to any regulations.

The toxic danger of parathion requires special investigation. Martin12 has drawn attention to the uncertainty of constitution of commercial parathion, samples being known to vary from 70 per cent to 95 per cent in purity as O.-p-nitro-phenyl θ.O.diethyl thiophosphate. Distillation to produce greater purity is associated with the formation of an isomer with greater animal toxicity and much less insect Also, German material formerly toxicity. regarded as parathion has since been found to be based upon dimethyl and not the diethyl thiophosphate; and the dimethyl product has greater insect toxicity and lesser The question posed by animal toxicity. Martin is: how can the toxic risks of a material like parathion be assessed when it is not a pure material but one that may contain different proportions of varyingly toxic substances in different samples?

A new organo-phosphorus type of insecticide was announced during 1950-EPN, or ethyl-p-nitrophenol thionobenzene phos-phonate. It is claimed to be safer than other members of this new class though possessing some degree of animal toxicity. Another development (as yet experimental) reported was Gearphos, a mixture of parathion, the safer methyl analogue, and a third substance said to act as an inhibitor of the human toxic effects of the parathion class.

#### Problem Formidable

However, the problem created by these highly toxic organo-phosphorus insecticides, however effective they may be as pest control agents, is still formidable. Their advocates suggest that they are indispensable materials, that without their use food would not be produced. This is not a particularly objective use of the word "indispensable" for it is only necessary to point out that these materials have been discovered quite recently and food production has been achieved without them for many decades of modern intensive cultivation.

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## Erucic Acid Separation

ERUCIC ACID, a substance of great promise for the manufacture of soaps, waxes, lubricants, plasticisers, and emulsifiers, is found in relatively high percentage in fatty acids derived from the seed fats of rape and mustard plants, both of which grow readily in Canada.

A project of the oils and fats section. Division of Applied Biology of the National Research Council of Canada, is concerned with the rapid and simple separation of a practical grade of erucic acid which might be used for the preparation of various derivatives and as a partial substitute for stearic and oleic acids. Recent work in this field involved crystallisation using solvent-solute ratios of from 10: 1 to 20: 1 and cooling in acetone for 24 hours at 40° F. This procedure yielded about 50 per cent of an erucic acid fraction of practical purity and about 50 per cent of an acetone-soluble more unsaturated acid fraction.

Erucic acid of higher grade can be obtained by a preliminary cooling of the acetone solution to 20° F., which precipitates most of the saturated fatty acids. Vacuum fractional distillation of the ethyl esters prepared from crude erucic acid permits the isolation of an ethyl erucate of high purity.

Various erucic acid derivatives have been synthetised; these include metal salts, substituted amine soaps, and esters. Hydroxy acids have been prepared from sulphated acid fractions. Some erucic acid derivatives are hard solids meriting consideration as waxes.

Rapeseed, mustard seed and weed seed s have been air-blown for various periods, and the blown oils studied as possible components of lubricants or plasticisers. The blown rapeseed oil showed the best miscibility with mineral oils, while blown weed seed oil was superior to rapeseed oil in alcohol solubility.

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## SUTHERLAND DOLOMITE

A REPORT by the Steetley Co., Ltd., Durham, to a meeting of Sutherland County Council at Lairg recently states that dolomite deposits at Loch Eriboll, Durness and Assynt, in Sutherland, and at Kishorn, in Ross-shire, are too variable in impurities to warrant further consideration for the production of high-grade magnesia.

For refractories, with the exception of Eriboll, the high variation in silica content is objectionable (subject to a close boring of deposit) at all occurrences. At Eriboll, the shattering of the thinly laminated stone beds may present difficulties in crushing and grading to specific sizes for burning. The cost to the steel maker would be prohibitive. Another factor which cannot be overlooked is the possible disruption of supplies in winter.

The report declared that there was little reason to believe that raw stone for doloma refractories could be obtained and delivered by sea and rail into the Glasgow area for less than 35s. 6d. per ton from Eribol, or 33s. from Kishorn.

## Local Demand Important Factor

For agricultural purposes, the Eriboll and Durness limestones would be economical for local requirements only, and operations and costs would depend entirely on whatever the local demand might be. It should be possible with a regular production to produce for 15s. per ton, excluding commercial profit and carriage.

To send the Eriboll stone by sea for final pulverising would be less attractive than direct production at Kishorn from which centre equal and better prices could be offered to a wider selling area.

Kishorn supplies would have the advantage of the lower delivered prices of spreader service to all intermediate areas within a 40-mile radius of the production centre. Movement of labour would be necessary to Eriboll, involving housing in country with no essential services.

The position might be easier at Kishorn, subject to the requirements of the hydroelectric scheme. No electric power was available at Eriboll, and the nearest point was 50 miles away. A power supply could be made available at Kishorn.

Eriboll must depend on sea transport for any major operation, and the building of a pier would be essential. The nearest rail centre was at Lairg, some 50 miles away over rough country. Kishorn had road facilities with the railway eight to nine miles away. For sea transport a pier would be needed, as in the case of Eriboll. The report stated that "little information on which to estimate the quality and quantity of the dolomite and limestone beds is available, in spite of detailed examinations of surface exposures by the geological survey and by the dolomite group of the Scottish Council (Development and Industry). To obtain such information a network of boring operations would be essential.

## FAR EAST SCIENCE CONGRESS

THE first session of the Pan Indian Ocean Science Congress was inaugurated at the Indian Institute of Science, Bangalore, on 2 January by the Prime Minister of India, Pandit Jawharlal Nehru. About 50 leading scientists from various countries of the world, 2000 delegates from India who also came for the 38th Session of the Indian Science Congress, and distinguished visitors attended. Among those attending from England were Professor P. M. S. Blackett, Sir Lewis Fermor, Professor Pierls. Professor Rosenfeld, and Sir John Russel.

The chairman of the Reception Committee stated that Indian science was honoured by the presence of these delegates and extended a most sincere and cordial welcome to them on behalf of India.

The increasing realisation of the importance of science in the Far East has culminated in the organising of a body styled the Pan Indian Ocean Science Congress. The proposal to hold such a session was conceived of by the Australian Council of National Research and was warmly welcomed by the Government of India. Under the initiative of the Prime Minister, the first session was invited to India. Australia, New Zealand, Ceylon, Malaya, Burma, Japan, Madagascar, Iran, and Pakistan were officially represented by their delegates. The Pan Indian Ocean Science Congress will discuss common problems of mutual interest both from the theoretical and practical standpoint under different sections.

## Australian Development

An important chemical industry is to be established in Victoria by Imperial Chemical Industries of Australia and New Zealand. The company will be granted a lease of 8000 acres at Gelliondale in the south-eastern region of the State by the Victorian Government. It is proposed to mine the rich brown coal deposits in the district as part of the general plan. Development is expected to take up to two years.

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## VERSATILE COAL

## More Data on a Valuable Chemical Storehouse

A LTHOUGH the crisis in currently available coal resources is still severe, chemists have continued their preparations for the day when this valuable mineral will be freely available for chemical purposes. Relevant and allied material published during the year may be considered under four main heads:—

 Chemicals from tar by more refined fractionation or by chemical transformations.

2. Rare elements from coal.

Chemical or physical attack on coal to make new substances.

4. Methane from coal.

Of these, only the third can be considered affected by the coal shortage since, if a large market developed for such new substances, it might be impossible to divert coal immediately to meet the demand. For varying reasons, the other three categories of development are little influenced by the current situation. If an extensive demand arose, for instance, for new pure chemicals or plastics derived from coal tar, it would hardly be likely that more ovens would be built to carbonise more coal to yield more tar to provide more of one fraction of which a sub-fraction may be treated for the desired product. Derived from coal though they are, such products are sufficiently remote and each represents so small a proportion of the original that they exert little in-fluence on the demand for it. The supply of refined products would only be likely to have an influence by reducing the quantity of crude product (e.g., a coal tar fraction) available. Similarly a "large demand" for rare elements or their compounds is a quantity of an entirely different order from the ordinary annual tonnages of coal. Methane is in quite a different category since it can be obtained before ever the coal is won and while it remains in the ground, as will be discussed further below. In the case of the production of new substances from coal, the influence on supplies should still be little.

Even if this reached the thousand-

tonnage level, repercussions could only be local and temporary. It may be useful, in order to give perspective, to recall, for instance, that coke ovens normally take twenty-two million tons per year of coal and power stations thirty million. These are figures of an entirely different order from those for the output of even well-established individual chemical products.

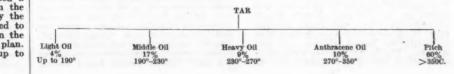
#### Tar Chemicals

There are now in Britain three main centres of work on coal tar. The National Coal Board itself naturally carries on detailed investigation of the chemical composition of the types of tar produced by its coke ovens in order to find out how to make the most profitable use of them. This work—at the N.C.B. Central Research Establishment near Cheltenham—is supplemented by that of the Coal Tar Research Association, which the Board also support. Main lines of work reported from here are the splitting of water and tar emulsions, the solvent treatment of tar and development of the uses of byproducts. Among these are fluorene, phenanthrene, carbazole, pitch, oils and greases.

The third important centre of work on coal tar is at the Chemical Research Laboratory, Teddington. There the principal lines of attack have been the isolation of pure chemicals using exceptionally high-efficiency stills and the development of new resins from various tar constituents.

Surveying the potentialities of this "treasure house of chemicals" in this journal, M. Kaufman rightly deplored the fact that with present methods only about 7 per cent of the tar is used as a source of chemicals. Yet the N.C.B. alone produce over 300,000 tons of tar, not to mention 100,000 tons of crude benzole annually. A good return could therefore be expected for any investment in development work and new plant.

The first products of normal distillation are as shown in the following diagram:—



In a recent paper, Dr. W. Idris Jones' pointed out that very little of our coal tar is distilled in modern equipment, and accordingly knowledge on the nature of the chemical composition is not at present exact. At the N.C.B. Establishment great importance is being attached to spectroscopic analysis for information on the structure of the chemicals present as well as for analysis.

### The Most Useful Type

Coke oven retorts are the most suitable of the three main types in use-horizontal, vertical and coke oven-for the subsequent extraction of chemicals. At present only a small number of well-known compounds are isolated from the tar. These include benzene, toluene, xylene, naphtha and pyridine. Phenols and cresols are also obtained, together with naphthalene and anthracene. Over 90 per cent of the tar is used in a crude mixed condition as a fuel or for road surfacing or timber preserving. Trends in present thought are towards considering further chemical breakdown of the tar constituents in addition to more accurate and far-reaching fractionation. A whole range of wellknown but little-utilised poly-nuclear compounds have been reported by Kruber as easily obtainable from tar. They include carbazole (with the important dyestuffs as possible derivatives), both the methyl naphthalenes, fluoranthene and pyreneto name only a few of the possibilities.

Closely linked with this subject is that of benzol recovery from coal gas. This is, of course, not a new subject, but it is one on which new information has been presented during the course of the year in the form of a valuable report by the Ministry of Fuel. Over 300 gas works were visited, employing many different coals and differing in many respects in procedure. Production was found to be greatest from intermittent vertical retorts. The report gives information and comments on many aspects of production including discussions of washer and still efficiencies, packings in tower scrubbers, behaviour of washers operating under pressure and instrumentation. It is evident that there is still great scope to raise benzol yields by using better plant in a better way and, when supplies permit, by more discrimination in the choice of coals.

## Rare Elements from Coal

Ammonium sulphate is, of course, well known as an inorganic product of coal carbonisation. Less well known are two other inorganic products which have been extracted—the metals gallium and germanium. The former remains a substance with unique electrical properties but no

applications as yet. Germanium, however, is now being applied in the radio valve industry for non-vacuum tubes.

The detection of germanium was first reported by the late Dr. Goldschmidt who was examining spectrographically a number of German coals for trace elements. It is said that for comparison he obtained from his local museum collection at Gottingen a 70-year-old sample of English coal labelled "Hartley, near Newcastle." The ash from this sample proved to be the richest specimen in germanium which has ever been examined. It contained 1.1 per cent of germanium.

One other sample from the Yard seam showed 1 per cent of germanium in the ash, but an examination of over 100 samples from the same and adjacent seams showed no figures higher than 0.5 per cent in the coal ash.

Germanium tends to be found in flue dust rather than ash. It is volatilised from coal during combustion, particularly in a reducing atmosphere, and its volatility is increased if chlorides are present.

Germanium for use in modern crystal diodes and triodes is extracted from the flue dusts from Northumberland and Durham coals, and processes for the extraction of the germanium in a high state of purity have been developed.

Gallium in coal behaves in a similar manner to germanium. This also is found in larger quantities in the Northumberland and Durham coalfields. Flue dusts have been found derived from coal in these fields with from 0.04 to 0.55 per cent of gallium.

## Techniques Developed

The importance of these elements, of course, lies in the fact that germanium exerts an electrical rectifying action on alternating currents so that it can be applied for this purpose. In addition, techniques have been developed which permit modulation and de-modulation to be applied using germanium crystals, thus greatly extending their range of use. Gallium's unique property is to show a ratio of 7:1 in respect of its electrical conductivity along axes at right angles.

A wide range of other elements are, of course, found in coal, but usually it would be wildly unreasonable to consider their extraction. Nevertheless, before the war lump pyrites used to be picked out, and early in the war coal pyrites fines were washed out, for their sulphur content for making sulphuric acid. Other elements detected include fluorine, chlorine, phosphorus, arsenic, boron, germanium, copper and zinc. Russian workers report having

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found iridium, beryllium, platinum and ytterbium among others, using spectroscopic methods of analysis. The possibility of extraction is not discussed and the main significance of the work is as an aid to the solution of coal seam correlation problems.

## **Direct Treatment of Coal**

The most striking advance during the year in the field of chemical or physical treatment of coal has not been along the paths of oxidation or Fischer-Tropsch type of synthesis, but by attack by amine solvents. Coal disperses in a colloidal condition when immersed in certain simple organic amines. Discussion of the equilibria, concentrations and character of the solute are all of considerable significance for the elucidation of the character of the coal substance. Immediate industrial significance attaches, however, to a particularly interesting effect which can be produced by the amine solvents. The powerfully solvent action reduces the coal to a state of sub-division unattainable by any other means. At the twelfth annual general meeting of the BCURA, the president, Sir Charles Ellis, F.R.S., explained that the paste obtained on adding the dispersion to an excess of coal sets firm when warmed. This product can then be used directly to manufacture small parts of various kinds, as well as extruded tubes and rods. The coal "solutions" remain stable on pouring into water, but are immediately flocculated by addition of dilute acids. The "solution," furthermore, may be used as a binding material for unfired zircon or other refractory materials -a field in which BCURA have made further progress. After binding in this way, the formed refractory has sufficient "green" strength to permit machining. The ultimate product may be made densely impermeable or porous as desired.

## Most of the Gas Wasted

Most of the methane which is given off by coal seams in the course of mining is wasted. It mixes with the ventilating air and normally constitutes not more than 1 per cent of this air when it reaches the surface. When evolved, however, the methane may be exceedingly pure, often comprising as much as 98 per cent of the gases given off by the seam. At the Point of Ayr colliery, the methane has been regularly drained by boring from one seam to another. It has been reported from Germany that the flow of methane in tappings of this type tends to increase as coal workings on nearby levels approach the region of tapping; this is presumably due to slight distortions, movements and opening up of fissures through which the

gas can flow. At the colliery quoted above, the methane is being used as a boiler fuel, being collected and piped to the surface before dilution. The Coal Board have also stated that they were making preparations to start further experiments at four pits. This incidentally helps to make gassy pits safer and to improve mining efficiency. It is particularly interesting that the methane is drawn off through boreholes from strata above or below the one being worked.

Possible uses for the gas if it can be brought to the surface in sufficient quantity, are as a fuel for boilers, or, diluted, as fuel for gas turbines and also as a chemical raw material. Although the paraffins are traditionally presented as inactive compounds—their very name expresses this property—there are in fact several methods of attack which can "open up" methane for synthetic purposes. They include oxidation, de-hydrogenation and chlorination. For the moment these methods remain only as low rated potentialities.

## Another Source Being Studied

Another important source of methane is also being studied. Up to two million tons per annum of methane are discharged from the coal mines in ventilation shaft air, apart from the special trapping measures which were described above. This represents a serious wastage of calorific value and well justifies the work which in fact is reported to be contemplated.

Linked yet different is the work on underground gasification of coal which was initiated in Britain last year. Russian workers have reported several successful operating installations working along these lines and experiments with varying -generally poor-success have also been announced in America, France, Belgium and Italy. The main principle is that a gas circuit is created by one of a group of possible engineering techniques and that this includes a section or channel within a buried coal seam. Either electrically or by incendiary bomb the coal is ignited in situ and the combustion maintained by blowing air, oxygen-enriched air or air with steam in order to maintain reaction. The latter may be a combination of producer gas and carbonisation processes, or water gas and carbonisation processes. Principal possibility considered for the issuing gas is as a fuel for gas turbines, but its use as synthesis has also been mooted and some pre-war Russian experiments were reported along these lines. If the process can be controlled to give reasonable uniformity of composition

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these are likely to be among the cheapest synthesis gases obtainable.

It may be recalled that in the German Lurgi process, lignite was carbonised at 20 atmospheres pressure in oxygen, greatly increasing the gas calorific value to values approaching that of ordinary town's gas.
The possibility of thus enriching gases
produced by underground gasification has
also been tentatively put forward, since the use of pressure percolation methods implies that adjoining strata to the coal are relatively impermeable.

#### Conclusion

Coal is indeed a complex "chemical" rich in possibilities of chemical application by physical or chemical attack, by pyrolysis or even by its slow maturing in the ground. Once the crisis of production has been met, the challenge to chemists to find more and higher grades uses will increase. The only trends in coal consumption which can reasonably be accepted by a technical man today are to see the wasteful open-fire consumption of this valuable mineral even more reduced, and its specialised use in terms of its enormous wealth of potentialities greatly increased. To the development of this vitally important social trend, the chemist and chemical engineer can make an important contribution.

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  3 "Possible use of the Spectroscopic Method of Analysis in Questions of the Correlation of Coal Deposits," by V. V. Zinoviev, Bull. Acad. Sc. U.S.S.R. (Phys. Scr.), Vol. 12, No. 4, 1948, p. 475.

  3 "Benzol and Toluene from Coal Gas. Report on technical work 1941-1948." Ministry of Fuel. H.M.S.O. "Survey of New Materials in Coal Tar." Angewandle Chemie, 61, 1949, p. 59.

## **Brazilian Exemptions**

THE Brazilian Ministry of Agriculture has issued a list of materials which may be imported into Brazil without import licence. The list includes insecticides, fungicides, etc., of marks registered at the of Vegetable Sanitary Department Defence and co-related raw materials. The following are among the chemical products specifically mentioned: arsenates of calcium and lead, with a minimum of 40 and 30 per cent, respectively, of anhydrous arsenic and maxima of 75 and 50 per cent of soluble arsenic; white arsenic, 99 per cent pure; cyanurets of calcium, potassium and soda, with 42, 95 and 95 per cent purity; organic compounds of copper, sul-

phur, mercury and zinc; synthetic com-pounds of rotenone; DDT, 50 per cent pure; sulphur in various forms, 96 to 99 per cent pure; fluosilicate of soda and barium, 95 per cent pure; fluoride of barlum, 99 per cent pure; nuoritae or soda; red phosphorous; hexachloride of benzene; HCB or BHC and mixtures based on DDT and HCB; sulphates of copper, iron and nicotine; substances to increase the efficiency of the above, such as

adhesives, emulsions, detergents, etc.
The list includes fertilisers and specifies following: Cyanuret of calcium, chlorate, potassium hyperphosphates, kali salt, sulphates of ammonia and potassium, superphosphates of calcium with 20 to 21 per cent P2O5.

Chemical materials for use in the cold storage and other plants to process animal and vegetable products are also exempt from prior licence, namely ammonia, calcium chloride, materials for treating water and for use in veterinary services, on chicken farms, etc., such as sulphates of aluminium and ammonia, fluorite of soda, concentrates of vitamins A and D, and mineral mixtures for feeding stuffs.

## Canadian Journal of Research

THE CANADIAN Journal of Research, which is at present published in six sections, A to F, will, from 1-January 1951, change its form. Each section will now be published as a separate journal with its own distinctive name and the designation "Canadian Journal of Research" will no longer be used. The present names and the corresponding new names are as follows :-

Present Name Canadian Journal of Research, Section A (Physical Sciences) Canadian Journal of Research, Section B (Chemical Sciences) Canadian Journal of Research. Section C (Botanical Sciences) Canadian Journal of Research, Section D (Zoological Sciences) Canadian Journal of Research, Section E (Medical Sciences) Canadian Journal of Research, Section F (Technological Sciences)

New Name Canadian Journal of Physics Canadian Journal of Chemistry Canadian Journal of Botany
Canadian Journal of Medical Sciences
Canadian Journal of Technology.

In order to preserve continuity the present sequence of volume numbers will be retained, and in each case the volume for 1951 will be Volume 29.

Subscription rates remain the same.

## THE MAGADI LAKE IN KENYA

## Vast I.C.I. Project

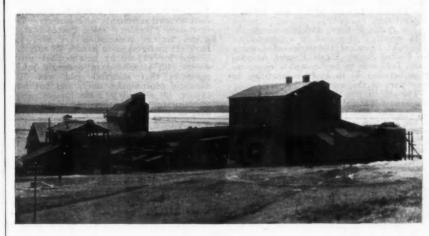
The floor of Lake Magadi is entirely composed of sodium carbonate which reforms as the water flows into the spaces from which the deposit has been removed. Thirty square miles have been proved by bore holes to a depth of ten feet, showing some 40 million surface tons in sight, but the total deposit is estimated at 200 million tons. For shipment, about 30 per cent of moisture is evaporated by means of oil fuel.

Caustic soda was first produced in 1918. Over a period of years Japan has taken about two-thirds of the output. Salt, for which there is a local market for 10,000 tons, is manufactured, as well as other products.

The photographs show: top, soda awaiting removal. Right, native workers collecting soda, and below, a view of the plant.







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## INTERNATIONAL AGREEMENTS STUDIED

U.S. Report on Cartels in the Alkali Industry

IN accordance with a ruling of the United States District Court of New York, which declared the activities of the United States Alkali Export Association, Inc., and California Alkali Association to be in violation of the Sherman Antitrust Act, the U.S. Federal Trade Commission has prepared and submitted to Congress a report on "International Cartels in the

Alkali Industry."

The report deals with the nature, extent and effects of international agreements concerning soda ash, caustic soda, and baking soda to which organised groups of European and American alkali producers were parties from 1924 to 1946. Information for the report was obtained from the Commission's own files and from the record of the antitrust proceeding which resulted in a decision by the United States District Court for the Southern District of New York on 12 August 1949 (U.S. v. U.S. Alkali Export Association et al. 86 Fed. Supp. 59) holding that the defendants were not exempt from the provisions of the U.S. Export Trade Act.

## Dividing World Markets

The report traces the steps by which the United States Alkali Export Association, organised under the Export Trade Act in 1919, first competed for several years with the cartelised European alkali manufacturers and later, through a series of understandings and agreements, co-operated increasingly to divide world markets, establish quotas, fix prices, and restrain competition

The result of these understandings, the FTC noted, "as stated in a letter from Imperial Chemical Industries of London to United States Alkali Export Association, Inc., was to be complete co-operation between us to avoid competition in

any part of the world '."

The effectuation of these understandings required collateral understandings, agreements, and acts to limit competition and trade both in the home markets of the parties and in foreign joint markets. Prominent among these, the FTC cited efforts to control exports by independent producers. In the United States, an understanding was reached in 1929 that United States Alkali Export Association would "take the necessary steps to control Inyo (Inyo Chemical Company) and any other makers of alkali products in the U.S.A., so that by stabilisation of

prices we (Imperial Chemical Industries) may achieve some benefit from our arrangement with you (United States Alkali Export Association, Inc.)."

Alkali Export Association, Inc.)."
Accordingly (the FTC report to the Congress states) United States Alkali Export Association undertook to sell Inyo Chemical Company's exports. In 1931 the tonnage marketed for Inyo represented two-thirds of all soda ash exported by the Association. Later, after Inyo became bankrupt, three other new California producers began shipping to Europe. There-upon, at the insistence of European producers, United States Alkali Export Association was instrumental in bringing about the formation of California Alkali Export Association in 1936, to dispose of California ash as directed by it. In consideration of these arrangements, the cartel agreed, in 1936, that the continent of Europe (except Russia), the British Empire (except Canada), and all of Egypt, the Levant, Iraq and Iran would be exclusive to the European members, and that Canada, Mexico, Cuba, Haiti, and San Domingo, Dutch East Indies, and Dutch West Indies would be exclusive territories of the American producers. All other markets were classified as joint territories to which the cartel members agreed to ship under quota arrangements.

#### Supressing Competition

A source of trouble in operating under the cartel agreements was unauthorised competitive selling of alkali by independent export merchants and brokers. To curb such "bootleg" sales, United States Alkali Export Association are said to have (1) undertaken to handle all surplus offered for export by non-member producers; (2) stipulated in domestic sales contracts that material sold was for domestic consumption only, and not for export; (3) refused to make further sales to domestic distributors and consumers who permitted material to "leak" into unauthorised export channels; (4) developed an elaborate statistical system to obtain information regarding shipments made outside the association; (5) maintained inspectors at ports to scrutinise shipments for export; (6) compiled and circulated blacklists of independent exporters classed as "bootleggers"; and (7) had standing orders with certain parties to purchase any free tonnage which might enter unauthorised export channels,

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## AMERICAN CHEMICAL NOTEBOOK

COMPOUND F, a third hormonal substance claimed to have the same antiarthritic activity as cortisone and ACTH, has been successfully synthesised by four chemists of the research department of Merck & Co., Rahway, New Jersey. The synthesis was announced by the investigators, doctors N. L. Wendler, R. P. Graber, R. E. Jones and M. Tishler, at the annual meeting of the American Association for the Advancement of Science in Cleveland, Ohio. The new compound was produced by altering two steps in the production of cortisone. It is expected that commercial manufacture may begin shortly and that it may be cheaper to produce as the synthesis can be started from cholic acid which is more plentiful than the desoxycholic acid.

INCREASED production of oxygen and nitrogen in both liquid and gaseous form, will be made possible by a new plant to be built at Butler, Pennsylvania, by a division of the Air Reduction Co., Inc., New York. The plant which is being constructed by the Koppers Co., Pittsburgh, is expected to be in operation by the end of this year.

THE minimum wage for three categories of chemical and related industry workers in America has been increased by edict of the U.S. Labour Department. The increased wages will benefit all employees working on contracts subject to the Public Contracts Act, which includes military, defence, and government contracts. The new minimums, which are at least tencents an hour more than the recently enacted minimum wage law requires, have been set at \$1.40 per hour for bone black, carbon black and lamp black sections of the industry, and at 85 cents per hour for cleaning and polishing preparations, insecticides, fungicides, and miscellaneous chemical workers. An increase to \$1.15 per hour has been established for the refined basic chemical branch of the industry.

OFFICIALS of the Bethlehem Steel Company have announced that the huge iron ore project in Venezuela, known as the El Pao mines, is nearing completion. The first shipment of ore is expected to leave next month. The American company's development, handled through its subsidiary, the Iron Mines Co. of Venezuela, involves a block of 16 iron ore concessions considered among the richest ore deposits in the world.

THERMAL decomposition of Colorado oil shale is the subject of a report recently issued by the U.S. Bureau of Mines. The report describes a laboratory study of the rate at which kerogen-organic matter largely insoluble in solvents for petroleum but easily converted to gas, shale oil and residual carbon by heat—was separated from oil shale at various temperatures. Various oil shale samples were pulverised and pressed into cylindrical pellets of approximately uniform size. These pellets were heated in an accurately controlled electric furnace for periods ranging from 24 hours to ten minutes. The amounts of gas, shale oil, and bitumen (benzene-soluble organic matter) formed during each heating period at different temperatures were measured. The laboratory apparatus also included a condenser cooled by dry ice, and equipment for controlling the flow of the inert gas, helium, with which the entire system was flushed during the heating period.

DIETHYL acetylsuccinate, described as a beta-keto ester, a highly reactive chemical useful in the synthesis of a wide range of org\_mic compounds, including many organic acids and ketones, is being made available for the first time in research quantities by the Merrimac Division of the Monsanto Chemical Company, Everett, Massachusetts. Possible compounds incorporating the chemical which are of particular interest, according to L. F. Loutrel, Jr., the division's development director, are the pyrazolones, useful as intermediates in azo dyes, and certain coumarins which are fluorescent in alkaline solution. The product also has uses as an intermediate in the synthesis of compounds with biocidal activity.

A NATIONAL Asphalt Research Centre has been established at the Franklin Institute Laboratories for Research and Development, Philadelphia, Pa., and is scheduled to be opened officially this January. Set up on a nation-wide scale, with sponsoring companies representing oil, roofing, moulded products, linoleum, sealing compounds and allied industries, its basic purpose will be to further the development of a scientific technology which will permit the formulation of better asphalts for specific purposes and the development of new applications for asphalts.

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## **AMERICA READY FOR 1951**

THE American chemical industry enters 1951 "better prepared that at any time in its history to meet the demands of a strong national defence," according to George W. Merck, president of Merck & Company, Rahway, New Jersey, and head of the Manufacturing Chemists' Association.

In a year-end report prepared for the American Chemical Society, Mr. Merck states that while there are definite limits to production capacity for supplying both military and civilian needs, the chemical industry believes it is in a position to continue essential contributions to American living and at the same time be ready for whatever turn the war emergency may take. With the enlarged armament programme already moving at accelerated speed, the outlook, Mr. Merck declares, is for mounting pressure on supplies in almost all chemical lines, and for more and much tighter controls.

All indications are that the Federal Reserve Board index of industrial chemicals production, which reached a new high of 457 in September, 1950, continued to rise during the last quarter of the year and will do the same this year, Mr. Merck's report states, although the rate may be slower since from now on increases must come almost entirely from new capacity. The index, which employs the 1935-39 level as 100, already is considerably higher than the World War II peak of 412, attained in June, 1945.

#### **Production Continues to Rise**

Virtually all branches of the industry shared in the 1950 production gains, the report states, adding:

"A major factor behind some of the gains was the upsurge in plastics and synthetic resins, one of the largest and fastest growing chemical - consuming groups. These materials showed a production spurt during the first eight months of the year that carried them to a new record almost 50 per cent beyond the same period in 1949. Total 1950 output is estimated roughly at a million tons, a milestone that was hard to envision a short decade ago.

"Along with its sister industry—synthetic fibres—plastics appear to be well on its way to overshadowing all other contenders for the honour of top consumer of chemicals."

Synthetic detergents likewise continued their rise, marking their first billion-pound year. Insecticides and other agricultural chemicals were at peak demand as a result of high levels of farm income and unusually severe insect infestations during the growing season. Other consuming industries cited as contributing importantly to the boom in chemicals in 1950 were automobiles, building materials, household appliances and textiles.

"Definitely not a contributor, however, were the world export markets," Mr. Merck reported. "In the first eight months of 1950 the excess of exports over imports of chemicals fell to \$371 million from \$453 million during the same period in 1949. Total value of U.S.A. chemical exports from January to August, 1950, was \$461 million, down \$64 million from the 1949 period. At the same time, U.S.A. imports of chemicals over the eight months period increased from \$72 million in 1949 to \$90 million in 1950."

In general, direct defence orders were not felt particularly by the chemical industry until the last quarter of 1950, and even then they were responsible for only a relatively small share of total production. Combined with stockpiling and swollen civilian demand, however, the effect was sufficient to create shortages in several important categories, notably sulphur and benzene.

A significant achievement of 1950, it is noted, was the first actual commercial production, by two oil companies, of synthetic benzene from petroleum. Output was small, however, and the price was some 30 per cent higher than that of benzene from coal tar.

#### Inflation Serious Problem

. Where shortages of chemicals are a result of insufficient processing capacity, a major problem in financing new plants is presented by the current inflationary trend. In the case of long-established basic chemicals, now sold at prices reflecting plant construction costs of ten to 20 years ago, much higher prices would be required if any profit were to be realised from the manufacture of the same chemicals in new plants built at today's costs.

Average hourly earnings in the chemical and allied industries continued their steady upward trend in 1950, but industrial chemical prices in September were still under 1948 levels although they were up 6.8 per cent from 1949. Over this same period, wholesale prices for all industries increased 10.4 per cent.

## INDIAN INSTITUTE of CHEMICAL ENGINEERS

T HE third annual meeting of the Indian Institute of Chemical Engineers was a three-day session, held in the Indian Institute of Science, Bangalore, from 30 December to 1 January. The session was largely attended by members from different parts of India and by some foreign experts.

In welcoming the delegates and members of the Indian Institute of Chemical Engineers, Professor Thacker, Director of the Indian Institute of Science, said that the prosperity of a country depended upon the progress of its chemical industry. In the U.S.A. and the U.K. chemical engineering was considered very impor-tant, and this branch of engineering attracted the maximum number of students every year. He referred to the plans drawn up by the National Planning Commission which envisaged a great increase in the productive capacities of chemical industries such as soap, paper, glass, cement, sugar, ceramics, heavy chemicals, synthetic petrol, plastics, dyestuffs, etc. In starting industries such as these they had to depend on foreign machinery, but for small-scale industries he felt that machinery could be made in India to suit local needs.

## Profession Not Popular

In the course of the presidential address, Dr. H. L. Roy said that the subject of chemical engineering was so wide and varied that a chemical engineer should be very well suited (and in a better position than a mechanical engineer) to manage engineering operations. He said that chemical engineering was not popular in India because the graduates did not find suitable employment in industry. He felt that the industrialists in India were not prepared to take risks in chemical industries while the returns on these industries were about 7 to 8 per cent, although this was about the same as in similar industries in the U.S.A. and the U.K. Indian industrialists felt that chemical engineering graduates in India were not of a high quality. He advised industrial engineers and members of the teaching staff to equip themselves for the better discharge of their duties and to train up the younger generations to better standards. He strongly advocated the scheme to train chemical engineering graduates in several factories under proper guidance. stated that on the basis of the syllabi for chemical engineering and chemical tech-nology framed by the All India Board of Technical Studies, India was expecting better chemical engineers and technologists in the near future.

He stressed the importance of chemical engineers paying attention to the design and manufacture of equipment in India.

## Planning Work Reviewed

Sir J. C. Ghosh, Director of the Indian Institute of Technology, Calcutta, in a special address reviewed the work of the National Planning Commission. He said that plans were of two categories, viz., those of immediate benefit to the country and long-range programmes. The national Government had realised that a greater emphasis had to be laid on the immediate extension of existing agricultural and industrial production. The Government also felt that, excepting certain essential industries of strategic importance, private industries should be allowed to expand their production. They had realised that private capital might not be forthcoming for major industrial development like the expansion of iron and steel production, synthetic fertilisers, synthetic petroleum, penicillin, telephones, and the like. The Government had formulated a policy of entrusting these projects to the corporations with non-official representatives on their advisory boards.

A symposium on "Organic Versus Inorganic Manures" was held, in which a number of foreign scientists participated. Dr. H. Martin-Leake, of Cambridge, said India would do well to press on with her well-founded plans for the return of all organic wastes. Short cuts to increased production such as the excessive use of artificial nitrogenous manures, under the conditions which prevail in Uttar Pradesh, for example, were attended by the gravest risks.

Dr. J. A. Prescott, of the Waste Agricultural Research Institute, Adelaide, narrating his South Australian experience, said that he was inclined to regard organic manures primarily as sources of inorganic nutrients providing both the known and unknown elements of biological importance.

Dr. C. N. Acharya, Director of Compost, New Delhi, said the only way to save India's lands from gradual conversion into deserts was to adopt sound methods of agriculture based on the use of organic manures and absence of stimulants.

Papers from agricultural laboratories of Sholapur, Cawnpore, Madras and the Indian Agricultural Research Institute expressed the view that organic and inorganic manures have their own uses and both should be regarded as complementary to each other.

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# HOME

International Chemistry Conference

The 16th conference of the International Union of Pure and Applied Chemistry will be held in New York and Washington from 8-16 September.

Methods of Heat Transmission

Professor R. J. Sarjant, O.B.E., will address the Chemical Engineering Society of Leeds University on Thursday, 18 January on "Modern Developments in Heat Transmission."

Copper, Lead and Zinc Prices

From 8 January, the prices at which copper, lead and zinc will be sold (subject to licence) by the Ministry to consumers in the United Kingdom will be the prices ruling on the next working day after the consumer's order is posted, and not, as at present, the day on which the order is posted.

Tube Makers' Record

New records were set up last year by Stewart and Lloyds, tube manufacturers. Set with a target of 1,115,000 tons of steel ingots the company produced 1,141,000 tons compared with the previous record of 976,000 tons achieved in 1949. Steel tube output was also increased to 730,000 tons as against 705,000 tons in the previous vear.

British Firm's \$260,000 Order

A Sheffield steel firm, Edgar Allen & Co., Ltd., has secured a contract for approximately 1,200 tons of manganese steel castings for lining ball and rod mills at a large copper mine in Chile. As the order originated in New York, some \$260,000 are involved. Some of the castings will be made in the steel foundry of a subsidiary of the company in France.

An incubator invented by a Leeds Hospital engineer, and built by Laboratory Thermal Equipment, Ltd., Saddleworth. has saved the life of a baby born 14½ weeks prematurely. The baby weighed only 21 or at birth and was kent is the only 21 oz. at birth and was kept in the incubator until the date she should have been born. It was designed to give prebeen born. It was designed to give pre-natal humidity and temperature condi-tions and it is hoped that it will give premature babies almost a 100 per cent chance of survival. Dr. Caleb Binns of Laboratory Thermal Equipment, Ltd., who worked with the inventor, told the Press that his firm had worked on the incubator for almost two years.

Change of Address

The industrial department of Philips Electrical, Ltd., which was previously located at 122 Snow Hill, Birmingham, has been transferred to the main branch premises at 28a and 28c Ludgate Hill. Birmingham.

Lecture Course

Seven lectures on "The Thermodynamics of Phase Equilibrium in Two-Phase Two-Component Systems, and related Topics" by R. F. Strickland-Constable, M.A., D.Phil., are to be given on Wednesday afternoons at 3 p.m. in the chemical engineering and applied chemistry department of the Imperial College of Science and Technology, South Kensington, London, The first will be on 17 January.

Literature on Drying

The Department of Scientific and Industrial Research is engaged in a survey of the literature of drying with a view to compiling a bibliography and discovering what fundamental aspects of the subject need investigation. So far as is known, the only published general bibliography is the compilation by E. A. Alliott contri-buted to the second volume of the Transactions of the Institution of Chemical Engineers. Since then a considerable amount of new material has been published.

New Chamber of Commerce

The Anglo-Israel Chamber of Commerce. 46 Seymour Street, London, W.1 (Tel.: AMBassador 1801), states in its first Newsletter that the Chamber has now been registered with offices at the address mentioned. Mr. Leslie Gamage, M.A., M.C., vice-chairman and joint managing director of the General Electric Company, Ltd., was elected president; Mr. Israel M. Sieff, vice-chairman and joint managing director of Marks & Spencer, Ltd., was elected chairman; Mr. Sidney J. van den Bergh, O.B.E., of Lever Bros. & Unilever, Ltd., was elected vice-chairman. The executive committee of the council comprises: Mr. L. Istorik (Anglo-Palestine Bank, Ltd.); the Rt. Hon. Lord Kilmarnock, M.B.E. (Harris & Dixon, Ltd.); Mr. M. N. Lubin (Imperial Chemical Industries, Ltd.); Mr. W. MacGillivray (Prince Line, Ltd.) and Mr. Sidney J. van den Bergh, O.B.E. (Lever Bros. & Unilever, Ltd.). The council have appointed Mr. E. J. Aaronson, A.C.A., to be gravely scartage of the Association be general secretary of the Association.

# OVERSEAS

Soviet Scientist Dies

Professor Lev Berg, the Russian academician, president of the Soviet Geographical Society and a professor of Leningrad University, died on Christmas Day at the age of 75. He was one of Russia's most outstanding scientists and author of many works on zoology, geology and other subjects.

Cuban Nickel Plant to be Reopened?

Because of the shortage of nickel in the U.S., the reopening of the Nicaro Nickel Co., in Cuba, is being considered by the U.S. Government. Last September, the Congress appropriated \$5 million to finance the project and the Freeport Sulphur Company is at present making an engineering survey for rehabilitation of the plant. The reopening of the plant would serve to increase the current world production of nickel by about ten per cent.

A loan of U.S. \$35 million is to be granted by the International Bank for reconstruction and development to a Brazilian firm, S.A. Industria e Comercio de Minerios (ICOMI) for the development of the Amapa manganese reserves. Arrangements have also been made for the active participation of the Bethlehem Steel-Corporation in this enterprise. This corporation has agreed to purchase 500,000 tons of manganese p.a., with an option of 49 per cent of the total production.

U.S. Phosphate Rock

The U.S. Bureau of Mines has announced that the tonnage of phosphate rock mined in the U.S. during 1949 fell from the record 1948 total of 9.388,160 tons to 8.877.474 tons. Decreases were shown in Florida and Tennessee but there was a considerable increase in the production of Western rock, which, however, did not approach the record 1947 level. Contrary to the trend in mine production, quantities used increased from about 8.668,800 to 8.987,000 tons between 1948 and 1949.

Russia Continues Export of Ores to U.S. Since the start of the Korean war Russia has increased exports of manganese and chrome ore to the U.S.A. This was stated by U.S. Commerce Department officials on 20 December. The reason for the increase was not understood but some officials thought that Russia's need for dollars overrode all other considerations. The total value of imports from Russia in

October fell to £750,000, but the value of manganese and chrome ore was only £107,000 below the September figure of £464,000. American exports to Russia were so small that they were not officially listed.

Venezuelan Refinery Expansion

A new refinery plant has recently been put into operation at Puerto La Cruz by the Sinclair Oil & Refining Co. The plant has a capacity of 35,000 barrels per day and will bring the total refining capacity of Venezuela up to nearly 300,000 barrels daily, an increase of over 50 per cent since the end of the war. Construction of the new plant was started in the spring of 1949. Venezuela's first lubricating plant is now under construction at the new Punta Cardon refinery of Venezuela Oil Concessions Ltd., a subsidiary of the Shell group. The addition of this new unit will provide a wide range of finished lubricating oils, aggregating from 2000 to 2500 barrels per day. The plant is scheduled for completion in the latter half of 1951.

Oil Refinery for Brazil

A new oil refinery, with a daily capacity of 45,000 barrels, is to be constructed in the State of Rio de Janeiro. Negotiations to this effect have been concluded with financial interests in France and the Netherlands.

New Canadian Chlorate Plant
The construction of a new chlorate plant
with an annual capacity of 20,000 tons is
expected to be completed in 1951. The
plant is being built by the Electric
Reduction Company of Canada, Ltd., at
Buckingham. Quebec, to meet everincreasing Canadian requirements. Recent
interest in chlorine dioxide as a bleaching
agent, especially for bleached pulp, has
made necessary increased plant capacity
in Canada to make sodium chlorate as a
source of chlorine dioxide.

Manufacture of Zinc Oxide in Australia A new Australian company which will make zinc oxide in Melbourne, has affiliation with British and Canadian interests. The overseas companies are Durham Chemicals, Ltd., of Great Britain, and Durham Industries, Ltd., of Canada. In addition to zinc oxide a range of other products for the rubber, paint, plastic and allied industries will be made. Special zinc oxide grades are to be produced for the Australian market.

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# PERSONAL

SIR ALEXANDER FLEMING, British scientist, who discovered penicillin, was on 1 January elected an honorary fellow of the National Institute of Sciences in India.

Mr. J. Arthur Reavell, chairman of the Kestner Evaporator & Engineering Co., Ltd., of London, and Kestner (S.A.) (Pty.), Ltd., Johannesburg, has left England on a visit to South Africa. During his stay he will inspect a number of works where Kestner plants and processes are in the course of erection and w.ll discuss new projects with the leaders of the South African chemical, food and allied industries.

MR. W. G. ASKEW has been appointed to the staff of George Kent, Ltd., as technical journalist, responsible for relations of the firm with the technical Press. He Industry, The Institute of Metals, and editor of Chemistry and Industry. After a short time in London, Mr. Askew will move to the Luton works.

MR. H. A. R. BINNEY, C.B., has been appointed director and secretary of the British Standards Institution in succession to the late Mr. Percy Good, C.B.E.

MR. NEELY TURNER, entomologist at the Connecticut Agricultural Experiment Station, New Haven, Con., has left for England, where he



Herts.

Mr. Neely Turner

sted after a year on the staff of the Connecticut Station, under the exchange agreement between the two institutions. While in New Haven, Dr. McIntosh devoted his time to a study of the particle size of chemical compounds and the ways in which this factor affects their toxicity as insecticides. He will continue research in this field after returning to his post of chemist at Rothamsted.

The American Chemical Society's 63,000 chemists and chemical engineers have elected Dr. EDGAR C. BRITTON as 1952 president of the Society. Dr. Britton is director of the organic research laboratory of the Dow Chemical Company, Midtory of the Dow Chemical Company, Midland, Michigan, and a pioneer in the development of many new insecticides, weed killers and pharmaceuticals. President of the Society this year is Dr. N. HOWELL FURMAN, Russell Wellman Moore Professor of Chemistry at Princeton University, who succeeded Dr. Ernest H. Vol. Willey, president of Abbott Lebors. VOLWILER, president of Abbott Laboratories, North Chicago, Illinois.

In the 30 years since Dr. Britton joined the Dow Chemical Company staff, more than 260 patents for new synthetic organic chemicals have been issued in his name. His contributions include improved methods of producing carbolic acid and acetic acid as well as the development of compounds for use as insecticides, fungicides, herbicides, pharmaceuticals, and catalysts for the production of the key synthetic rubber ingredient butadine from the gas butylene. He is a member of the American Association for the Advancement of Science, the American Institute of Chemists, the Society of Chemical In-dustry, and the Chemical Society of London.

Mr. B. O. ASHFORD has been appointed development engineer of its Eastleigh works by the Pirelli-General Cable Works, Ltd. The position is a new one and the duties will include the co-ordination of all development within the factory and liaison with technical and scientific institutions. Mr. Ashford joined the company in 1929 as chief chemist, a post in which he is now succeeded by Mr. A. N. COFFIN.

SIR HENRY WILSON SMITH, a second secretary at the Treasury since 1948, has resigned to take up an appointment on the board of Powell Duffryn, Ltd., on 1 February. Sir Henry, who is 46, was head of the Overseas Finance Division of the Treasury and has played an important rôle in the country's economic recovery.

PROFESSOR R. E. PEIERLS has returned to Birmingham after a three-week visit to India. The Professor had been to attend an international conference on Elementary Particles sponsored by the Tata Institute, Bombay.

# The Chemist's Bookshelf

THE MODERN SOAP AND DETERGENT INDUSTRY. By G. Martin. 3rd Edn. Revised by E. I. Cooke, London. 1950. Vol. 1. Theory and Practice of Soap Making. Price 50s, net.

The preface to this third edition relates that the demand for Dr. Martin's book has been and still remains so great that it has been found necessary to publish a third edition. We do not wonder at this; the book is encyclopædic and indispensable to those engaged in soap-making and allied industries. It is packed with information, and this feature completely overshadows all else. When Dr. Martin wrote this book he built something that would endure, and although to-day it is open to criticism

it is still a great book.

The revision has been sketchily and unevenly carried out, and despite the teeming flood of research papers and teeming flood of research papers and patents published since 1981 (the date of the second edition), there are relatively few references in this new edition to such work. Secondly, such information as has been added does not seem to be unfailingly reliable, e.g., although the constitution of muscone is given more or less correctly in Section IV, page 32, it is given incorrectly in Section IV, page 41. Similarly, the formula of Irone is given (IV, 37) as C13 H20O, whereas it should, of course, be C14H22O, and no reference at all is made to its first true synthesis in 1947 by Naves and by Ruzicka. Thirdly, the pagination should goad all but the most phlegmatic of readers to a frenzy. Instead of finding "231" at the outer top corner of the page, one find "I. IV., 37" in the middle at the bottom of the page, each of the seven sections of the book being separately numbered. Furthermore, the book carries no index; it is true that on "Vol. 1, Appendix, Page 4" we read "Note—A full Index of the work appears in Volume II," but it is also true that anyone who pays 50s, for a technical book is entitled to an index. A serious omission is the lack of any sort

of description of the newer methods of testing detergent power. A description is given of a method of applying a "standard soil," but there would seem to be no indication that instruments such as the Launderometer and the wash-wheel are available for standard washing, nor that photometric methods have been developed to measure the whiteness of fabrics which have been given a standard soil and then washed with various detergents. The washing tests that have been standardised by the Society of Dyers and Colourists might, too, have found a place in Vol. I.

But in spite of these and other similar mistakes and omissions, the book contains a wealth of valuable information, and its subject matter comprises the following:

Section I. Nature of Soap and Detergent Action.

Section II. Organic Raw Materials used in the Soap Industry. Section III. Inorganic Raw Materials

section III. Inorganic Raw Materials used in the Soap Industry.

Section IV. Perfuming Substances used in the Soap Industry. Section V. Manufacture of Soap from

Free Fatty Acids.
Section VI. Boiling Process for the
Manufacture of Soap.

Section VII. Household and Laundry Soap.

Dr. Martin must have had a very keen appreciation of the possibilities of synthetics in the industry. As early as 1923, in his preface to the 1st edition, at a time when most of us had not even heard of detergents other than soap, he wrote: "It must not be forgotten that both mineral and organic substances exist-and new ones may be discovered at any timewhich equal if (they do) not surpass the salts of fatty acids-our soaps-in washing power." The author, indeed, is of the opinion that in the future the progress of the detergent industry will largely lie in the development of these new products. As the world's population increases, the supply of a valuable foodstuff like fat will hardly keep pace with the demand, and consequently manufacturers may be driven more and more to look in other directions for suitable detergents. Again, the production of fatty acids and consequently soaps from petroleum or hydrocarbon oils is a scientific possibility, and no doubt will be the next great technical achievement in the soap industry.-R.W.M.

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A MANUAL OF PLASTICS & RESINS. Edited by William Schack. Published by Chemical Publishing Co. Inc., New York, U.S.A. Price \$10.

This book on plastics in encyclopedia form is edited by William Schack with the co-operation of members of the Society of Plastics Engineers. The advisory board includes a number of well known American authorities on plastics, all specialists in their respective subjects. The publisher's blurb makes the claim that the book will tell you "all you want to know about plastics" and to a limited extent this claim is justified. The manual contains some 1500 subjects and in addition to full length articles, it includes hundreds of short articles on products and definitions of basic moulding, fabricating and chemi-cal terms. The major fields of plastics applications, such as aircraft, automotive, electrical appliances, housewares, refrigerators, etc., are all discussed in detail and each article tabulates not only the components for which plastics are used. but also the specific plastic used for each and the properties which make it suitable for the purpose. There are, however, many omissions, some important and others not so vital, but all worthy of being mentioned in a book claiming to be fully comprehensive. In particular, it is noticeable that definitions of many scientific and technological terms are missing, e.g., no mention is made of density and no explanation given of "powder density" which is of interest to moulders. The authors have not included "hysteresis" and ignored such terms as "torsional hysteresis."

A few of the entries seem to be out of place, e.g., the important fluorinated plastics material, polytetrafluorethylene, one would expect to find after polyterpene resins, but, instead, it is inserted after "Testing" and given the monomeric name instead of the polymeric nomenclature. Some of these omissions are remarkable in view of the generous space which the editor and his advisory board have given to the less important applications of plastics, e.g., playing cards receive nearly half a page of text.

As a reference book this manual is a useful addition to the manufacturer's library, but in view of the many omissions one doubts the validity of the publisher's claim that it tells you "all you want to know about plastics"!—P.I.S.

INDUSTRIAL CHEMICALS. By W. L. Faith, D. B. Keyes and R. L. Clark. New York: John Wiley & Sons, Inc. (\$8.00); London: Chapman & Hall. 64s.). Pp. XII + 652.

This book answers the need for the compilation in a single volume of important technical and economic data concerning the major industrial chemicals, of which 106 are dealt with. The authors who are active in industry and teaching, have collected information spread so widely and often hidden obscurely in a multitude of books, periodicals and pamphlets, etc. The selected chemicals are discussed each one in accordance with the following outlines: Name and chemical formula; Manufacturing processes in current use, including simplified flow sheets and important process variables; Equations for the principal reactions involved and average yield expectation in per cent of theoretical; Raw material requirements per unit weight of commercial product, whereby in some cases, utility and labour requirements are shown; Production chart for past 20 years; Generalised use patterns; Prize chart for past 20 years; Miscellaneous data, physical properties, commercial grades, ship-ping regulations, and usual containers; Economic aspects, generally including historical data, a discussion of competitive processes and products, recent trends in manufacturing and sales, actual and economic plant size, and approximate plant cost; and finally a map showing the location of manufacturing facilities in the United States.

Information of this comprehensive type will be of great value, not only to those engaged in the manufacture and sale of chemicals and allied products, but also to those who use industrial chemicals or who have financial or other interests in concerns manufacturing or using industrial chemicals. The book should thus be a valuable asset to teachers and students of science, engineering, and economics, and should be suitable for use as a textbook in college courses in chemical technology and chemical economics.—F.N.

Adressbuch Deutscher Chemiker. 1950/ 51. Verlag Chemie, Weinheim/Bergstrasse. Pp. 438. Dm. 12.

This Directory, published together with the Society of German Chemists, contains, after an introduction of general information and regulations, the addresses of some 8000 chemists, particularly of Western Germany, and a list with local classification, both in alphabetic order. A large section of more than 160 pages of advertisements also makes this book a valuable buyers' guide. This directory, the publication of which has been suspended for many years, is in future to be published every second year.—F.N.

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# Next Week's Events

MONDAY, 15 JANUARY

The Chemical Society

Sheffield: Chemistry Lecture Theatre, The University, Western Bank, 5.30 p.m. Prof. Dr. Linderstrom-Lang: "The Structure and Breakdown of Enzymatic Pro-

Society of Chemical Industry London: Burlington House, Piccadilly,

W.1, 6.30 p.m. Prof. H. R. Kruyt: "The Relation between Pure and Applied Relation Science."

Leeds: Chemistry Lecture Theatre, the University, 7 p.m. J. Wolf: "The Con-trol of the Bacterial Population of the Atmosphere."

Leeds: Chemistry Lecture Theatre, the University, 6 p.m. Dr. J. L. Woods: "Coal Tar as a Colloid.

Royal Society of Arts London: John Adam Street, Adelphi, W.C.2, 6 p.m. Second of three Cantor Lectures by J. C. Swallow: "The Plastics Industry.'

TUESDAY, 16 JANUARY

The Chemical Society

Leeds: Chemistry Lecture Theatre, the University, 6 p.m. Prof. Dr. K. Linder-strom-Lang: "The Structure and Break-down of Enzymatic Proteins."

Society of Chemical Industry

Manchester: Chemistry Lecture Theatre, the University, 6.30 p.m. Prof. H. P. Kruyt: "The Relation between Pure and Applied Science.

London: Burlington House, Piccadilly, W.1, 5.30 p.m. Prof. R. L. Wain: " Plant Growth-Regulating Activity in the Aryl-

oxyaliphatic Acids.

London: Burlington House, Piccadilly, W.1, 5.30 p.m. R. H. Dolton: "The Application of High-Speed Centrifuges in the Chemical and Process Industries.

London: 26 Portland Place, W.1, 6.30 p.m. Dr. T. T. Jones: "The Melt-Viscosity of some Phenol-Formaldehyde Novolac Resins."

Institute of Metals

Swansea: University College, Metallurgical Dept., Singleton Park, 6.30 p.m. A. R. Powell: "Recent Developments in the Production of some of the Rarer Metals.'

Institute of Chemistry in Ireland

Dublin: University College, Upper Merrion Street, 7.45 p.m. E. M. Phibbin: "Polarography." F. J. Coll: "Chromatography.

WEDNESDAY, 17 JANUARY

Royal Institute of Chemistry

London: Waldorf Hotel, Aldwych, W.C.2, 6.30 p.m. Prof. H. Burton: "Some Oxidase Systems in Flour." Stockton-on-Tees: William Newton School, Junction Road, Norton, 7.30 p.m. Dr. W. A. "Chemical Constitution and Sexton: Biological Activity.'

Institute of Fuel

Manchester: The Engineers' Albert Square, 2 p.m. F. B. Karthauser: Developments in the Utilisation of Low Grade Fuels at Collieries.

THURSDAY, 18 JANUARY

Royal Institute of Chemistry

Aberdeen: Chemistry Department, Marischal College, 7.30 p.m. Dr. H. Baines: "Photography as a Scientific Implement." (Jointly with CS and SCI). Department. Scientific

Derby: Midland Hotel, 7.15 p.m. Prof. R. D. Haworth: "Recent Developments in the Chemistry and Natural Products."

Edinburgh: North British Station Hotel, 7.30 p.m. Prof. P. D. Ritchie: "Some Problems in the Structure and Physical Properties of Industrial High Polymers.' (Jointly with CS and SCI.)

The Chemical Society

London: Burlington House, Piccadilly, W.1, 7.30 p.m. Prof. Dr. K. Linderstrom-Lang: "Structure and Breakdown of Enzymatic Proteins."

Manchester: Chemistry Lecture Theatre, the University, 6.30 p.m. Prof. R. P. Linstead: "Some Recent Developments

in Macrocyclic Pigments."

FRIDAY, 19 JANUARY

Royal Institute of Chemistry Portsmouth: Municipal College, 7 p.m. G. N. S. Ferrard: "The Newer Plastics." Swansea: University College, 6.30 p.m. Prof. C. W. Shoppee: "Cortisone."

Institution of the Rubber Industry Leicester: College of Technology, 7 p.m. W. C. Wake: "The Physical Aspects of Rubber."

Manchester: Gas Showrooms, Town Society of Dyers and Colourists Hall Extension, 6.30 p.m. Dr. G. T. Douglas: "Continuous Fixation Processes for Water-Soluble Dyestuffs."

The Chemical Society
Glasgow: Chemistry Department, the
University, 7.15 p.m. Prof. C. K. Ingold: "Positive Ions in Aromatic Substitution."

## The Stock and Chemical Markets

HERE has been further broadening of THERE has been further this week, activity in stock markets this week, due partly to exchanging out of steel shares by many holders who had hoped for a last-minute reprieve from nationalisation, Reinvestment is taking place in selected industrial shares which according to City views may offer prospects of higher dividends, particularly in shipping shares. The latter, according to prevailing views, offer good scope for higher dividends owing to the big rise in freight rates. As far as industrial shares are concerned the uptrend in values is taking on the aspect of a general advance. This is in some ways remarkable because it continues to be assumed in the City that the Budget will bring higher taxation which will probably bear heavily on company profits and limit considerably the possibility of dividend increases. On the other hand part of the present activity in markets is due to short-term speculative buying in the hope of capital appreciation before the Budget comes along.

Although generally firm, chemical and kindred shares have only participated to a limited extent in the market uptrend. Imperial Chemical strengthened to 43s. 6d., Monsanto firmed up to 50s. 9d., Fisons were 25s. 3d. and Brotherton 21s. 4½d. F. W. Berk have changed hands around 12s. 6d., Boake Roberts around 33s., while Amber Chemical were 2s. 6d. and Albright & Wilson have been dealt in around 15s. 4½d. "ex" the share bonus. Helped by the interim dividend. W. J. Bush were 86s. 6d.

Lever & Unilever improved to 41s. 9d. on market expectations that the 10 persent dividend will be maintained. Moreover Turner & Newall at 86s. remained under the influence of the full annual report. Borax Consolidated at 57s. 3d. continued more active on market talk of higher dividend possibilities, but British Aluminium at 40s. 6d. eased a little. Plastics shares lost part of recent gains, British Xylonite easing to 91s. 3d. and Kleemann 1s. shares to 13s. 3d. British Industrial Plastics 2s. shares changed hands around 7s. but elsewhere. De La Rue further strengthened to 28s. The market is expecting that before long the latter company will bring forward capital increase plans, and that in any issue shareholders are likely to have preferential allotment.

Associated Cement at 87s, 3d. remained under the influence of the higher dividend. British Portland Cement were also at

87s. 3d., British Plaster Board 5s. units were 14s. 3d., and there was a firmer turn in paint shares which had recently been marked down on fears of reduced lead oxide supplies. Lewis Berger 4s. units firmed up to 31s., and Pinchin Johnson were 37s. 6d. British Oxygen at 90s. have shown firmness, the market expecting the dividend to be maintained despite the larger capital. Iron and steel shares developed activity, particularly shares of companies scheduled for nationalisation. The latter encountered a good deal of selling by holders who had been holding on in the hope that at the eleventh hour nationalisation would be postponed. On the other hand, steel shares have been bought by big financial institutions as a "cheap" means of increasing their holdings in gilt-edged, assuming steel stock is a 3½ per cent long-dated stock issued next month at par. Elsewhere, Staveley shares have strengthened to 81s. and Powell Duffryn were firm at 32s. 4½d.

In other directions, Boots Drug at 48s. have been well maintained. United Molasses rose to 52s. 6d. on revived talk of share bonus prospects. The 4s. units of the Distillers Co. firmed up to 19s. 9d. Oils have been more active, although Shell at 76s. 10½d. failed to hold all the rise which followed the higher interim dividend. Ultramar Oil scored a big advance at 27s. 44d.

## Market Reports

LONDON.-The overall demand for industrial chemicals has been fully maintained during the past week with consumers delivery specifications covering substantial quantities. The volume of inquiry for new business for home and export destinations is undiminished, but the spot supply position is becoming more difficult and the outlook in some directions must inevitably remain uncertain both as regards prices and supplies. Activity in the general run of the soda products continues brisk with quotations unchanged, while the potash chemicals remain firm against a steady pressure for supplies. The white and red leads are being steadily absorbed with the price position unaltered, and the recent advance in quotations for zinc oxide have not lessened the demand. In the coal tar products market all the light distillates are in strong request. A persistent demand for pitch continues both from

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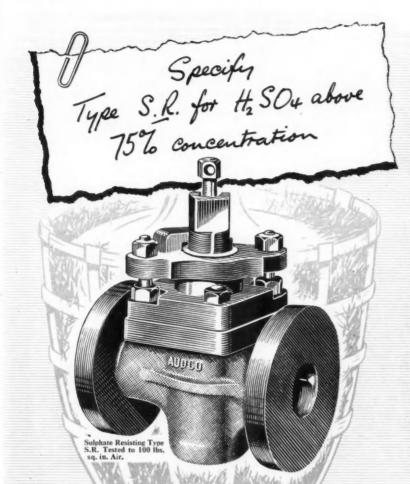
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The seats of plug and body in this Audco Type S.R. Valve are specially treated to resist sulphation. This is just an example of AUDCO'S

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### Law and Company News

#### New Registrations

Agden Salt Works, Ltd.

Private company. (490,036). Capital £100. Salt proprietors and miners, and manufacturers of mineral and chemical products of all kinds, etc. Subscribers: F. Thompson and J. B. Gowman. Solicitors: Clifford-Turner & Co., 11 Old Jewry, E.C.2.

Anglian Chemical Exports, Ltd.
Private company. (489,975). Capital £5000. Directors: E. R. Everard, O. S. Harper, E. E. Baxter. Reg. office: 129/131 Hornchurch Road, Romford, Essex.

W. C. Bacon & Co., Ltd.
Private company. (489,793). Capital
£5000. Objects: To acquire the business
of chemical merchants and agents formerly
carried on by W. C. Bacon & Co., Ltd.
(in liquidation). C. L. Tappley, B. C.
Hughes, A. Nash and F. W. Hayes.
Solicitors: Stoneham & Sons, 108a Cannon
Street, London, E.C.4.

Barrywald Manufacturing Co., Ltd.
Private company. (489,806). Capital
£5000. Manufacturers of and dealers in
electrical, chemical and sanitary equipment, makers of hospital, surgical
and laboratory fittings, etc. Directors: M. Coles Harman, B. B. Garle,
P. H. H. Jones and S. Lewis. Reg. office:
1 Leadenhall Street, E.C.3.

Geo. Hamlett & Sons, Ltd.
Private company. (490,062). Capital £100. Objects and other particulars are similar to those of Agden Salt Works, Ltd. (q.v.).

Industrial Waxes, Ltd.
Private company. (489,765). Capital £5000. Manufacturers of and dealers in all manner of natural and synthetic waxes, gums, oils, spirits, chemicals and pharmaceutical substances, etc. Subscribers: F. L. Filmer, J. W. Filmer. Reg. office: Alderman's House, Bishopsgate, E.C.

Larsen & Toubro (London), Ltd.
Private company. (489,767). Capital £10,000. Wholesale and retail general merchants, importers and exporters; chemical, mechanical, electrical, automobile and general engineers, etc. Directors: R. H. R. McGill, and Maurice C. Cole. Secretary: Chas. H. Gooch, 20 Elmer Gardens, Edgware, Mdx.

Manger's Garages, Ltd.
Private company. (490,078). Capital
£100. Subscribers and other particulars

are similar to those of Agden Salt Works, Ltd. (q.v.).

Manger's Salt Works, Ltd.
Private company. (490,079). Capital £100. Objects and other particulars are similar to those of Agden Salt Works, Ltd. (q.v.).

May-Lyon, Ltd.
Private company. (490,081). Capital £100. Chemists, druggists, salt proprietors and miners, etc. Subscribers and other particulars are similar to those of Agden Salt Works, Ltd. (q.v.).

Quickstryp Chemical Co., Ltd.
Private company. (490,089). Capital
£100. Chemists, druggists, salt proprietors
and miners, etc. Subscribers and other
particulars are similar to those of Agden
Salt Works. Ltd. (q.v.).

#### Increases of Capital

The capital of Arthur Berton, Ltd., 256-260 Old Street, E.C.1, has been increased from £120,000 to £250,000,

# THE STOCK AND CHEMICAL MARKETS continued from page 110)

home users and for shipment to the Continent, while carbolic acid crystals and creosote oil are being called for in greater quantities than are at present available. Cresylic acid is firm with exports of the American duty-free quality continuing at a high level.

GLASGOW.—The effect of the sulphur shortage is making itself felt in many ways. In a number of cases chemical supplies have become extremely restricted. Business in general, however, remains at a high level. The export market is becoming more difficult each day. In many instances supplies have dwindled almost to nothing.

Manchester.—Price conditions were strong due largely to the increasing scarcity of sulphuric acid and other raw materials. A steady demand was reported for textile and other industrial chemicals, new inquiries coming from both home and overseas buyers. Basic slag, superphosphates, and the compounds were in request in the fertiliser section, while in the tar products market a ready outlet was found for carbolic acid, cresylic acid and most of the light distillates.

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# Technical Publications

"CHEMICAL RESEARCH, 1949," is the title of a new book issued by DSIR, dealing with investigations carried out at the Chemical Research Laboratory, Teddington, during the year. Work has continued on the prevention of corrosion, the concentration of uranium in minerals and sulphate-reducing bacteria. The inorganic group has begun research into the possibilities of converting phosphate rock into fertiliser. Ion-exchange resins are being studied by the High Polymers and Plastics Section. (HMSO, 3s.)

FLAME-RETARDANT properties of plastic-insulated and rubber-insulated electric cable are compared in a report made by the Fire Research Station of the Department of Scientific and Industrial Research which is now available from the British Plastics Federation (2s. 6d.). The standard adopted was that defined by the American Underwriters' Laboratories, Inc., for thermoplastic-insulated cable, namely, that the cable should not convey flame nor should it flame for more than one minute. All samples of plastic insulated cables passed the test, but those which were rubber-insulated failed. Both types failed, however, when the cable was heated by an overload current of sufficient magnitude, thus introducing a shorting hazard.

NEW explanatory covering its wide range of aperiodic balances can now be obtained from L. Oertling, Ltd. An outstanding advance in balance design is the use in Models 52FM and 62FM of corundum for balance planes. This is claimed to be the hardest known substance adapted to this purpose. Laboratory tests have shown that corundum will preserve its optical flatness and with it the sensitivity and precision of the balance over many years of hard use.

TO some extent the advantages of the use of microfilm have not been fully appreciated owing to the absence of a really suitable means of reading. Projectors are useful for a number of people to view simultaneously, but unsatisfactory for individual viewing, requiring as they do the erection of screen, a darkened room, and an operator. A new reader has been developed by the Edison Swan group employing a modified optical system which gives a film-gate a few inches above table level and the screen just above the gate.

A complete brochure is being prepared giving full details of the instrument and its component parts together with operating and maintenance instructions and also notes on convenient methods of filing and storage of microfilm.

A NEW publication of the U.S. National Bureau of Standards, entitled "Tables for Conversion of X-ray Diffraction Angles to Interplanar Spacing," offers a timesaver for physicists, metallurgists, chemists, and other scientists interested in diffraction patterns. The first six tables give the interplanar spacing values in angstroms for the diffraction angles from 0° to 90° at intervals of 0.01°. These were calculated by using the wavelengths, adopted by the International Conference at the British Institute of Physics in 1946, for X-ray targets of molybdenum, copper, nickel, cobalt, iron, and chromium. The last two tables contain spacing values for copper and iron for angles from 0° to 180° at intervals of 0.02°.

CHANGES in the law made by the new Patents Act still leave the subject one of considerable complexity. The task of conveying the essential points to the lay mind has been successfully accomplished by Mr. Robert Lochner in a booklet now available from the National Union of Manufacturers (2s. 6d. post paid). The process of obtaining a patent under the new procedure is traced, and the obligations and rights which follow are also made clear. Mr. Lochner also proves a sound guide on the rights of the Crown to inventions in regard to the re-armament programme.

FACTORS which have determined the present location of the steel industry are examined in the main article of the Monthly Statistical Bulletin (Vol. 25, No. 11) issued by the British Iron and Steel Federation. The outstanding characteristics of the principal steelmaking districts are described, and the possibility or desira bility of any locational changes in view of post-war developments are discussed.

PROPERTIES and methods of applying Kel-F (trifluochlorethylene thermoplastic) dispersions are described in its latest technical bulletin (No. 4.10.50) just issued by the Chemical Manufacturing Division of the M. W. Kellogg Co., of Jersey City, New Jersey.

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.ICALS FOR EVERY INDUSTRY

### Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

#### Complete Specifications Accepted

Catalytic conversion of hydrocarbons and the like .- M. W. Kellogg Co. Oct. 6 1942. 646,910.

Preparation of powdered metals and/or metal carbides for extrusion.—British Thomson-Houston Co., Ltd. April 20 1944. 646,772.

Catalytic oxidation of ammonia to oxides of nitrogen.—Baker Platinum, Ltd., and C. J. Smithells. Dec. 10 1945. 646,631.

Insecticidal compositions.-A. P. H.

Dupire. March 9 1945. 646,911.

Basic alkyl esters and the preparation thereof.-Stirling Drug, Inc. Sept. 7 1945. 646,701.

Means and method of welding.-F. B. Dehn. (Titanium Alloy Manufacturing Co., and Arcos Corporation . Feb. 14 1946.

Coating of one metal with another .-Diffusion Alloys, Ltd., and R. L. Samuel. Feb. 27 1947. 646,637.

Coating of one metal with another.— Diffusion Alloys, Ltd., and R. L. Samuel. Jan. 23 1947. 646,638.

Process for the coating of non-ferrous metals.—Diffusion Alloys, Ltd., R. L. Samuel and N. A. Lockington. Jan. 20 1947. 646,641.

Machines for kneading and conveying plastic substance.-A. Gerstenberg. Nov. 26 1946. 646,913.

Process for simultaneously diffusing metals and carbon into iron and steel.—
Diffusion Alloys, Ltd., R. L. Samuel and
N. A. Lockington. Feb. 12 1948. 646,645,
Sulphur.—S. G. Deh.n. (Stauffer Chemi-

cal Co.). Feb. 14 1947. 646,916.

Benzene hexachloride and processes of making it .- A. P. H. Dupire. 1945. 646,917.

Production of plastic masses, foils, films, coating compositions and the like.— Geigy Co., Ltd., H. Jones and J. K. Aiken. Feb. 24 1948. 646,918.

Method for drying and semi-drying oils. Sana, Narodni Podnik. March 18 1947.

Metallisation of non-metallic surfaces .-Standard Telephones & Cables, Ltd., and C. F. Drake. April 23 1948 646,921.
Continuous tunnel kiln for firing

earthen-ware or refractory products.—R. Amand. May 22 1947. 646,783.

Separation of water-soluble oxygen-containing organic compounds from a mixture containing water.—Texaco Development Corporation. May 27 1947. 646,925.

Device and method for introducing regulated amounts of liquids into wash-water supplies .- London Solvents, Ltd., G. H. Tatham. June 29 1948. 646,927.

Reduction of metal oxides.-R. Planiol. July 2 1947. 646,789.

Methods of and apparatus for magnetic separation.-R. Planiol. July 2 1947. 646,790.

Process of forming a highly reactive carbon, and the highly reactive carbon resulting from said process.-Great Lakes ('arbon Corporation, July 21 1947, 646,711.

Stiffening of wool fabrics.—Trubenised, Ltd., and E. Higgins. July 19 1948. 646,930.

Preparation of photographic non-gela-tine emulsions.—Kodak, Ltd. (W. G. Lowe, L. M. Minsk and W. O. Kenyon.) July 21 1947. 646,712.

Process for imidising polyacrylamides.-Kodak, Ltd. July 21 1947. 646,713.

Process for polymerising acrylamides.-Kodak, Ltd. July 21 1947 646,714. Colorimeter.-W. J. Boyer. July 2

1947. 646,796.

Preparation of phenolic ethers and esters.—Harvel Corporation. July 30 1947. 646,715.

Electric primary cell and battery.-S. Ruben. July 30 1947. 646,799.

Alkaline primary cells.-S. Ruben. July 31 1947. 646,800.

Flourescent material.—Sylvania Electric Products, Inc. Aug. 1 1947. 646,802.

Manufacture of castings of steel or steel alloys .- P. G. Adeline. Aug. 8 1948. 646,804.

Treatment of keratinous material.-M. Harris, C W. Harris, L E. Fourt and Laboratories]. Sept. 30 1947. 646,809.

Process for producing mono-alkylbenzenes.—Monsanto Chemical Co. Oct. 8

1947. 646,941.

Process of producing aromatic sulphonamido pyrimidines.-General Aniline & Film Corporation. Dec. 5 1947. 646,946.

Process for the production of concentrated washing, degreasing, wetting, and emulsifying agents.—N.V. De Bataafsche Petroleum Maatschappij, Dec. 11 1947.

Production of antibiotic substances .-Abbott Laboratories. Dec. 16 1947. 646,819.

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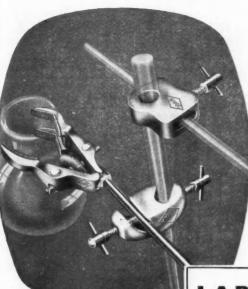
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#### PATENT PROCESSES

continued from page 116)

System for removing water from materials.—Combustion Engineering Co., Inc. Dec. 17 1947. 646,732.

Method of making integrated products. Owens-Illinois Glass Co. Dec. 18 1947.

Manufacture of vat dyestuffs.-Ciba, Ltd. Dec. 22 1947. 646,950.

Production of amino alcohols.-Polymer-Dec. 22 1947. isable Products, Ltd. 646,951.

Stabilised mineral oils.-N.V. Bataafsche Petroleum Maatschappij. Dec. 24 1947. 646,952.

Alkyl esters of alphacyano acrylic acid, and the preparation thereof.-B. F. Goodrich Co. Jan. 2 1948. 646,954.

Preparation of quaternary ammonium salts of N-phenyl-3, 5-diethyl-2-propyldihydropyridine.—B. F. Goodrich Co. Jan. 7 1948. 646,956.

Methods of preparing methyl ethers of aromatic hydroxy compounds.—E. I. Du Pont de Nemours & Co. Jan. 12 1948. 646,736.

Solvent extraction process.-N.V. De Bataafsche Petroleum Maatschappij. Jan. 22 1948. 646,959.

Process for stabilisation of solutions of capillary-active sodium alkyl sulphates and for production of stabilised solutions thereof.-N.V. De Bataafsche Petroleum Maatschappij. Jan. 23 1948. 646,827.

Production of derivatives of gamma-bromo-alkanoic acids.—United States Rub-ber Co. Jan. 30 1948. 646,960.

Process for carburising iron or steel.— Diffusion Alloys, Ltd., R. L. Samuel and G. A. Samuel. Jan. 17 1949. 646,657.

Processes for the preparation of farne-sylacetone.—L. Givandan & Co. Soc. Anon. Feb. 5 1948. 646,962.

Manufacture and production of artificial

threads from viscose.—Courtaulds, Ltd., and J. Wharton. Feb. 8 1949. 646,963.

Manufacture of an organic dinitrile.—
I.C.I., Ltd. (E. I. Du Pont de Nemours 646,964, 646,965. & Co.). Feb. 11 1948.

Phase - contrast Phase - contrast microscopy. — Cooke. Troughton & Simms, Ltd., E. W. Taylor

and B. O. Payne. Aug. 1 1947. 647,191. Catalytic synthesis of hydrocarbons.— J. C. Arnold (Standard Oil Development

Co.). Aug. 28 1946. 647,052.
Process for treating cellulosic raw materials.—J. C. Seailles. Aug. 29 1946.

Process of preparing enzyme-peroxidised peanut oil.—J. R. Short Milling Co. March 12 1947. 647,135.

Manufacture of gaseous or vaporous fuels from carbonaceous materials and means for generating heat therefrom.— C. Arnold (Standard Oil Development Co.). Sept. 6 1946. 646,982.

Manufacture of emulsions of the waterin-oil type and emulsifying agents and intermediate products therefore.—F. A. Moller. Feb. 26 1947. 647,183.

Method of refining mineral and shale oils, tar oils, and the like.—Aktiebolaget Seperator-Nobel. April 2 1947. 647,138. Insecticides.—P. E. Andersen, April 8

1948. 647,249.

Emulsions for use in fabric-decorating. Interchemical Corporation. May 16 1947.

Apparatus for determining the viscosity of fluids.—Fischer & Porter Co. June 13 1947. 647,140.

Insecticidal process and composition.— Pennsylvania Salt Manufacturing Co. June 18 1947. 647,252.

Phase-contrast microscopy. — Cooke, Troughton & Simms, Ltd., E. W. Taylor and B. O. Payne. June 28 1948. 647,207.

Processes for producing porous materials and porous material resulting therefrom. A. S. Behrman. July 11 1947. 647,142.
 Process for the preparation of substituted halogenated cyclopentadienes and

adducts thereof and compositions resulting therefrom.—Velsicol Corporation, July 17 1947. 646,985.

Preparation of unsaturated acid esters .-July 28 1947. Bakelite Corporation.

Metal-glass seal and sealing alloy .-Sylvania Electric Products, Inc. Aug. 5 1947. 647,254.

Composite glass-metal alloy article .-Sylvania Electric Products, Inc. Aug. 7 1947. 647.256.

Quaterary ammonium compounds and preserving and disinfecting compositions containing them.—Parke, Davis & Co. Aug. 7 1947. 647,258.

Process of synthesizing hydrocarbons.-Standard Oil Co. Aug. 8 1947. 647,155. 4-substituted-l-amino-ar-tetrahydro - 2 naphthols.-General Aniline & Film Cor-

poration. Aug. 18 1947. 647,209. 4-substituted ar-tetrahydro-β-naphthoxazolones.-General Aniline & Film Corpora-

tion, Aug. 18 1947. 647,210. Manufacture of artificial teeth from plastics such as methyl methacrylate.-

R. J. Pile. Aug. 26 1947. 647,261. Laminated structures.—Bakelite Corporation. Aug. 28 1947. 647,212. Processes of producing alkyl esters of

sulphonated monohydroxy-benzoic acids.-Monsanto Chemical Co. Sept. 12 1947. 647,160.

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Treatment of sugar-containing solutions. J. J. Naugle. Sept. 22 1947. 647,264. Phenolic condensation products and process of preparing same.—B. F. Good-rich Co. Oct. 1 1947. 647,063.

Methane sulphonic acids and derivatives hereof.-May & Baker, Ltd., and H. J. Barber. Nov. 3 1948. 647,214.

Production of organic halides.—May & Baker Ltd., and H. J. Barber. Nov. 3 1948. 647,215.

Storage apparatus for the transporta-tion of liquids.—G. Gill. Oct. 14 1948.

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Further particulars from the Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1. quoting No. 3399. 9539/250/Hz.

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